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CLINICAL IMPRESSIONS OF PROMETHAZINE IN ANAESTHESIA

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The ideal premedicant drug has yet to be discovered. At present no single agent achieves the two general purposes of pre-anaesthetic medication as suggested by Beecher:[1] (1) To present an acquiescent, well-rested, serene patient to the surgeon and (2) to minimize as far as possible the hazards of anaesthesia and surgery.

Much interest has recently been shown in promethazine and other derivatives of phenothiazine. Promethazine possesses a central depressant effect with predominant action at a subcortical level, as compared with a drug like morphine, where the depressant effect is marked at the cortical level.

Reticular Formation

The subcortical level referred to is the reticular formation—small islands of grey matter interspersed with fine bundles of nerve fibres.[2] It lies dorsal to the pyramidal tracts in the medulla, pons and midbrain. The reticular system comprises descending medial and lateral reticular tracts arising from the midbrain and pons and passing down in the reticular spinal tracts to the anterior-horn cells of the spinal cord.[3,4] These tracts are both inhibitory and facilitatory in nature, and effect a degree of control over reflex muscle tone, the respiratory centres, and the vasomotor centre. They also serve to transmit impulses received from the cortex, the basal ganglia and the hypothalamus.

Ascending reticular fibres are also recognized in the spinal cord. These receive connections *via* collaterals from the sensory spinal tracts and from the nuclei of the 9th, 10th and 11th cranial nerves. Passing through the pons, they receive further collaterals from the auditory and vestibular nuclei. After passing through the midbrain these fibres synapse with neurones from the cortical area.

There exists, therefore, a widespread interconnection between the classical sensory system, the reticular system, the hypothalamus and the cortex.

Arousal Reaction

Direct electrical stimulation of the reticular formation, especially in the region of the hypothalamus, causes a transition from a sleeping to a wakeful state.[2,4-6] The original experiments were performed by Moruzzi and Magoun[6] in 1949 on anaesthetized cats, and they demonstrated a sudden change in the EEG from a tracing indicating sleep to one indicative of wakefulness. This arousal reaction can also be produced by peripheral stimulation of a visceral or somatic nerve, or by direct stimulation of certain cortical areas.[2] Destructive lesions of the reticular formation render the animal permanently comatose. It does not exhibit the arousal reaction, although conduction is unimpaired in the classical sensory tracts.

French and King[2] have shown that electrical stimulation of the sciatic nerve of an anaesthetized cat produces no potential in the reticular system, whereas a potential can be recorded in the classical sensory tracts. When anaesthesia wears off, potentials can be recorded in the reticular system at about the time the animal regains consciousness.

It would appear, therefore, that an intact reticular system is required to initiate and maintain the state of wakefulness.[4]

PROMETHAZINE

Promethazine appears to be an approach to the ideal premedicant drug. It depresses the wakeful state without direct cortical depression, prolongs the action of barbiturates, and prevents vomiting of central origin.[4] The drug depresses the autonomic nervous system and has a tonic action on the pre-capillary sphincters. In addition it has an antihistaminic and a slight hypotensive and hypothermic action. Promethazine may, therefore, assist in reducing operative and anaesthetic shock and blood loss.

The drug was first used in anaesthesia by Laborit and Huguenard[7] in combination with pethidine and chlorpromazine in their 'lytic cocktail'.

Method

An attempt has been made to assess the patient's mental state and degree of nervousness before operation, and to premedicate accordingly with a combination of promethazine, pethidine and atropine. Adult patients were given a tablet consisting of 15 mg. of promethazine hydrochloride and 75 mg. of butobarbitone the evening before operation. In addition, during anaesthesia, blood pressure, pulse, colour and blood loss were observed and charted at regular intervals. A state of 'balanced anaesthesia' was maintained as far as possible by means of additional doses of either thiopentone, pethidine or promethazine.

Patients were assessed immediately after operation, and seen again some 6 hours later after return of consciousness. The time taken to recover from anaesthesia was noted, as was blood pressure, colour, and the amount of pain and of post-operative sedation required. Attention was also paid to restlessness, respiratory depression and vomiting.

In order to evaluate clinical impressions, it was felt desirable to divide the patients into several arbitrary groups. A grouping based solely on the type of operation and anaesthetic technique employed would introduce many variables and tend to make clinical judgment difficult. Each case

therefore was individually assessed in the light of past experience and the impressions gained were correlated. In this way it was hoped to determine the position of promethazine as a premedicant drug, and to evaluate its efficiency as an anaesthetic agent resulting, by means of selective depression of the reticular system, in smoother, quieter and safer anaesthesia and surgery.

This report covers 201 patients between the ages of 7 and 82 years operated upon for a variety of conditions (Table I). In order to facilitate observations a simple chart and graph were used to record the patient's condition before, during and after operation.

TABLE I. CASES BY GROUPS

Group A. Children 7-14 years		
Tonsillectomy	30	
Appendicectomy		
Inguinal Herniorraphy		
Group B. Intra-thoracic Procedures		
Lobectomy	7	
Mitral Valvotomy	2	
Bronchoscopy+Bronchogram	20	
Group C. Major Abdominal Procedures		
Gastrectomy	7	
Cholecystectomy	20	
Hemi-colectomy	3	
Group D. Minor Abdominal Procedures		
Appendicectomy	35	
Inguinal Herniorraphy	20	
Group E. Elderly Age Group		
Smith-Petersen pin	8	
Appendicectomy	3	
Intestinal obstruction	2	
Group F. Potentially Haemorrhagic Procedures		
Thyroidectomy	6	
Radical Mastoidectomy	6	
Vaginal Hysterectomy and repair	20	
Orthopaedic procedures	12	
Total	201	cases

RESULTS

Group A

Age-group 7-10 *years.* These patients were given 12·5 — 25 mg. of promethazine 1 hour before operation. Upon arrival in the theatre, 9 out of the total of 20 patients appeared to be adequately sedated, and although not asleep showed no signs of apprehension. Induction in most cases was smooth with thiopentone or nitrous oxide, oxygen and ether sequence. Salivation was only marked when ether was used, otherwise the antisialogogue action of the drug appeared to be sufficient. Of the 9 well-sedated children, 6 had spent 3 days or longer in hospital, and when seen on the day before operation had settled down well in their new surroundings. The remaining 11 children showed various degrees of sedation; 5 of them were restless and 2 cried while being induced with thiopentone.

Age-group 10-14 *years.* The 10 patients in this group were given 25 mg. of promethazine and 1/150 gr. of atropine. 2 received 25 mg. of pethidine as well. This group was lightly sedated upon arrival in the theatre, and in most cases induction with thiopentone was smooth and the course of anaesthesia uneventful.

In group A, 20 patients vomited at the end of the operation, but showed few signs of nausea when seen later in the wards. They had all received ether during anaesthesia.

With 6 exceptions all slept for 2-4 hours after surgery, and there were no complications which could be attributed to anaesthesia.

In this group promethazine alone appeared to be a satisfactory premedicant drug, producing in most cases a light degree of sedation. Recovery from anaesthesia was fairly rapid and post-operative nausea was not troublesome.

Groups B and C

Patients in groups B and C were given 50 mg. of promethazine, 50-100 mg. of pethidine, and 1/100 gr. of atropine 1 hour before operation. With 10 exceptions, all 59 were well sedated upon arrival in the theatre. Few patients in this group showed subjective or objective signs of apprehension, although a routine check on blood pressure before induction showed a rise above resting level in the ward in 8 cases. It is interesting to note that where blood pressure was elevated just before operation, the course of anaesthesia was often not smooth.

Relaxants and controlled respiration were used in every case, and supplementary doses of thiopentone, promethazine or pethidine were given during the course of anaesthesia. Small doses of thiopentone appeared to be most effective in producing smooth anaesthesia. Results with fractional doses of promethazine were not impressive, and even after repeated doses of 10-15 mg. several patients continued to move and showed signs of returning consciousness. In most cases blood pressure showed an initial rise and then remained fairly constant throughout the operation. When anaesthesia was not smooth the rise was greater, and fractional doses of promethazine were not effective in reducing it to the normal pre-operative level.

Blood loss appeared normal in all cases and there was no great reduction in bleeding in groups B and C. Several patients in these two groups exhibited marked vasoconstriction of the face during operation. This condition did not respond to promethazine, but did improve after additional doses of relaxant and/or thiopentone.

Twelve patients were very restless after operation and required immediate sedation with pethidine in the ward. Most of these patients had received fractional doses of promethazine only during anaesthesia.

Post-operative nausea was uncommon and recovery from anaesthesia was only delayed when promethazine and pethidine had both been used during the course of the operation. No patients in groups B and C showed any signs of respiratory depression which could be attributed to drugs used during anaesthesia, and in all cases protective reflexes were present before they were returned to the ward.

Group D

The 55 patients in group D received the same premedication as groups B and C. None were completely paralysed during the operation and respiration was assisted whenever necessary. Surgery was usually of short duration. All were well sedated upon arrival in the theatre and 12 were asleep but could be roused and answered questions satisfactorily. Left to themselves they would fall asleep readily.

Induction and maintenance of anaesthesia was smooth with thiopentone and minimal ether. Most patients in group D slept for 1-4 hours after operation, although protective reflexes had returned before they left the theatre. This group did not receive supplementary doses of promethazine during anaesthesia.

Post-operative respiratory depression was not observed, and nausea and vomiting was troublesome in 7 cases. Restlessness was not evident and only light post-operative sedation was necessary in most cases.

Group E

The 13 patients in group E were all above 70 years of age and were premedicated with 25-50 mg. of promethazine and 1/100 gr. of atropine. Four patients in this group suffered from chronic bronchitis and one was an asthmatic. Sedation appeared to be adequate and all showed rapid recovery from anaesthesia. The course of anaesthesia was smooth and no complications occurred.

Group F

The 44 patients in group F received 50-100 mg. of pethidine, 50 mg. of promethazine, and 1/100 gr. of atropine 1 hour before operation. Sedation was again adequate in most cases, only 4 patients in this group appearing apprehensive. All patients were positioned after induction in order to minimize bleeding.

Haemorrhage seemed to be less than usual in this group, although only 5 patients showed a marked drop in systolic blood pressure after half an hour of surgery. Quiet induction and maintenance contributed in no small measure to freedom from undue haemorrhage and on 2 occasions the surgeon remarked upon the relatively dry operating field when promethazine had been used. Post-operative restlessness was never very evident and there were no anaesthetic complications in this group.

SUMMARY AND CONCLUSIONS

The results in this investigation brought out the importance of well chosen, adequate and properly timed premedication. Promethazine alone gave very good results when used for children and elderly patients. Sedation was usually light but satisfactory, and the antisialogogue action was adequate when a thiopentone, nitrous oxide and oxygen sequence was employed.

In combination with pethidine it gave very good results in major surgery when used as a premedicant drug. Fractional doses during anaesthesia did not appear to be as efficient as fractional thiopentone in producing quiet anaesthesia. Patients were frequently restless, and vasoconstriction of the face and a rising pulse and blood pressure were often seen.

Post-operative restlessness was often marked when promethazine only had been given during a major operation. Delay in recovery from anaesthesia usually occurred when pethidine and promethazine had both been used in fractional doses during surgery.

It would seem that in order to obtain smooth and safe anaesthesia, depression of the cortex and classical sensory routes is as important as depression of the reticular system.

Promethazine is an aid to quiet induction and smooth anaesthesia. Bleeding is reduced, especially if the patient is properly positioned, and alarming drops in blood pressure do not occur.

The incidence of vomiting was reduced and it was only troublesome when ether had been used.

Post-operative anaesthetic complications were minimal. Excluding group B, where pulmonary complications were very likely to occur, only 18 patients in this series developed a post-operative cough. One patient developed a patchy atelectasis of the left lung after gastrectomy. It is impossible to state that the use of promethazine reduced the incidence of post-operative pulmonary complications; nevertheless, it is a useful premedication for patients suffering from chronic bronchitis and asthma.

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BLUE COLLAGEN

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Blue colours in skin, feathers and insect cuticle, as is well known, do not arise from pigments, but as a physical consequence of the fine structure present. In feathers and insect wings, multiple film interference[1-3] is responsible; in insect cuticle, diffraction may be involved,[4] but in skin it has generally been taught that the colour is due to Tyndall scattering from fine particles in the optical media overlying a deeper, absorbent layer. In fish, reptiles and birds, the blue colours are often intense, and are produced by superficial chromatophores containing fine granular material, e.g. particles of guanine (in guanophores). In mammals, guanophores and xanthophores are not found, and the blue colours of intradermal naevi, veins, india-ink tattoo marks, and the like, have been attributed to Tyndall scatter from the collagen fibres. In certain mammals, however, far brighter blues are observed, which are comparable in brilliance to those seen in the necks of turkey-cocks and guinea-fowl. One such area is the scrotal skin of the vervet monkey *Cercopithecus aethiops pygerythrus*. Section of this skin reveals no guanophores such as are found in turkeys and guinea-fowl but, instead, a broad band of coarse, uniform collagen fibres is present between the epidermis and the melanoblast layer. The difference between these fibres and ordinary collagen is seen if they are illuminated with incident light, when the fibres reflect a brilliant iridescent blue or green light.

In the collagen fibres of the remaining duller blue skin surface of the vervet the same reflex is obtained, though the melanoblasts are closer to the surface, and the skin colour is much less brilliant. An exception is found in the penile skin, which is red as a result of the presence of superficial capillaries in the papillary layer of the dermis. Here the collagen tends to reflect white light rather than the shorter wave lengths.

The blue collagen represents a previously undescribed mechanism for the production of colour in mammals, viz. a form of interference phenomenon attributable to multiple fibrillar structure of the collagen fibres, rather than to multiple layers or Tyndall scatter. A more detailed description of this phenomenon will be published.[5]

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VAN DIE REDAKSIE : EDITORIAL

OEFENINGSTOETSE

Belemmerde vermoë om aan fisiese inspanning deel te neem is 'n algemene simptoom van velerlei siektetoestande. In hart- en longtoestande vorm die oefeningsvermoë van die pasiënt seker een van die belangrikste kliniese maatstawwe waaraan nie alleen die prognose en verloop van die toestand gemeet word nie, maar wat ook dikwels die soort behandeling sal aandui (mitraalstenose en chirurgie), en waaraan die respons op behandeling gemeet kan word. Geen geneesheer sal dus die belang van oefeningsvermoë onderskat nie. Die internis veral is terdeë bewus hoe belangrik dit is om die graad van belemmering in hierdie geval te skat.

Ongelukkig is oefeningsvermoë 'n *simptoom*. Ongelukkig is daar pasiënte wat besef dat ons dit moeilik objekties kan bepaal en deur gebrekkige medewerking kan hulle soms hulle aanspraak op kompensasie-uitbetalings verstewig met 'n numeriese indeks van hulle onvermoë tot inspanning! 'n Eenvoudige, betroubare, herhaalbare en veilige oefeningstoets word dus 'n volstrekte noodsaaklikheid, maar die ywer van uitstekende navorsers ten spyt, is daar nog nie tot op hede 'n ideale toets gevind nie.

Ons kan die bestaande oefeningstoetse in drie groepe verdeel,[1] nl. (1) Toetse gebaseer op ventilasiestudies, (2) toetse gebaseer op hartspoedbepalings, en (3) toetse wat bepalings van die maksimale suurstofverbruik benut, of die suurstofskuld, aangegaan tydens oefening, bepaal.

Harris[1] hersien die voor- en nadele van die onderskeie toetse volledig in 'n onlangse artikel. Die eerste groep sluit in die toets van Wahlund en die toets van Hugh-Jones. Ventilasiestudies berus op die feit dat dispnee ontstaan wanneer die ventilasievereistes na aan die beskikbare ventilasiekapasiteit kom. Die samewerking van die pasiënt kan hierdie toetse egter baie beïnvloed en, hoewel dié toetse in longfunksie-laboratoria baie gebruik word, is dit juis hier waar die Achilles-hiel is.

Hartspoedbepalings kan (*a*) die herstellende hartspoed in ag neem, bv. Master se traptoets, of die Harvard-traptoets, terwyl (*b*) die oefeningshartspoed in toetse van Wahlund, dié van Astraud en Ryhming, en Muller se toets, gebruik word. Laasgenoemde bereken 'n belastingsindeks (‚Leistungspulsindex', L.P.I.). Die fiks persoon het oor die algemeen 'n laer rustende hartspoed, maar omdat die fisiologie van oefenings-tachiekardie grotendeels onbekend is, is groot variasies moontlik in hierdie toetse. Geeneen van hierdie toetse kan tot dusver nog vir kliniese gebruik aanbeveel word nie.

Klinies gesproke sou dit wil voorkom of die mees bruikbare toetse onder dié wat O_2-verbruik tydens oefening bepaal, of dié wat die O_2-skuld bereken, gevind sal word, want geen pasiënt kan sy O_2-skuld willekeurig beïnvloed nie.

Hierdie toetse het dus afgebakende sektors getoon waarin verdere studie moet geskied, nl. (1) die meganisme van suurstofskuld en sy vereffening moet bestudeer word, en (2) die meganismes betrokke by die toename in hartspoed by oefening moet opgeklaar word.[1]

Uit 'n studie deur Wyndham en Ward[2] blyk dit dat hartspoed 'n liniêre funksie van O_2-verbruik is en dat beperking van oefening deur sirkulasiefaktore geskied.

Faktore wat nie so direk aan hierdie toetse verbonde is nie, tree ook na vore in gevalle met hipertensie waar longstuwing die beperkende faktor mag word en 'n beëindiging van die toets kon veroorsaak nog voor 'n suurstofskuld van enige betekenis ontstaan het, terwyl angina 'n spesiale probleem skep.[1]

Tot die ideale oefeningstoets gevind word, sal ons dus nog maar dikwels moet vertrou op die antwoord op vrae soos ‚hoe ver kan u stap op gelyk grond?' 'n Fiks huisdokter mag dalk die pasiënt se vermoë met sy eie vergelyk deur saam met hom hospitaaltrappe te klim.

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THE MEDICAL SERVICES PLAN

At the request of the Steering Committee of the proposed Medical Services Plan, we are publishing in this issue for general information draft Articles of Association and draft contracts for subscribers and participating doctors. The Steering Committee will shortly be calling an inaugural meeting* in Johannesburg of those who have signed intention cards to participate and have forwarded their loans to the Plan, at which these draft documents will be presented for final acceptance. The Plan will first be brought into operation in the areas of the Southern Transvaal and East Rand Branches of the Association, but the details of the proposed constitution will be of interest to all members of the Association. No tariff of medical fees appears in the draft documents, but it is understood that the fees will be based on the recognized customary fees without preferential deduction.

Some five years ago the Federal Council appointed, under the chairmanship of Dr. Maurice Shapiro, a Sub-committee on the Economics of Medical Practice to study the trends which were changing the form of practice and to ascertain where they were leading the profession. It was agreed that this Committee should have all the help that was necessary, and soon after the Committee commenced its activities it suggested that the Association should undertake the establishment of a medical aid fund for persons who did not fall within the scope of the existing societies. Professional assistance was obtained by the employment of an accountant with experience of medical aid and its administration to assist

* This meeting is to be held on 27 April (see p. 345 of this issue of the *Journal*.

the Committee, and he was later sent to the United States and Canada to obtain first-hand information concerning the Blue Cross and Trans Canada Plans which were meeting with great success in those countries.

The policy of the Association had for many years been to foster the existing medical aid societies and to encourage the formation of new ones; and when the proposal had been put forward earlier that the Association should itself establish a society, this had met with opposition, although it was generally agreed that provision was needed for those who were not served by medical aid societies. Enthusiasm for the establishment of a scheme seemed to be centred particularly in the Transvaal and mainly in Johannesburg and the Reef areas, where the Committee was extremely active and enthusiastically led by Dr. Shapiro who, in spite of many discouragements, has never lost faith in the ultimate success of the Plan. He has been ably assisted by a number of other members of the Southern Transvaal Branch of the Association. Although the Association decided not to establish the Plan as an activity of the Association itself, it gave its blessing to the Committee which was set up to work for the establishment of the Plan as an independent organization, and placed at its disposal the information which it had obtained through Dr. Shapiro's Sub-committee. The Steering Committee has now reach a stage when it should soon be possible to launch the Plan and bring it into operation.

We congratulate the organizers on their efforts and wish them success, trusting that both the public and the profession will derive much benefit from the Plan.

CAROTID BODY TUMOURS

WITH CASE PRESENTATION AND ANGIOGRAPHIC DEMONSTRATION

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There exists a considerable difference of opinion about tumours arising from the carotid body. Part of the controversy concerns the degree of malignancy, if any, of the tumours. This has a direct bearing on the treatment since resection of these tumours at the stage when the patients usually present themselves is technically difficult and frequently hazardous. Further controversy centres around the feasibility of removing the tumours without sacrificing the carotid bifurcation, and the dangers inherent in triple ligation of the common, internal and external carotid arteries, if resection of the bifurcation is deemed necessary.

Carotid body tumours are rare, and it is unlikely that any surgeon will encounter more than a few in the course of his career. As a result, one should benefit from the experience of others, as Monro[15] has indicated, and a periodic review of the situation, with reorientation of one's ideas, if necessary, is in order. The reader is referred to excellent reviews by Morfit *et al.*[16] and Byrne.[23] One further case is presented below, and the value of arteriography in diagnosis is indicated. This procedure has received scant attention, only 4 references to it having been found in the literature (Lichtenauer,[13] Idbohrn,[9] Wetzel[22] and Lipschitz[14]).

ANATOMY AND PHYSIOLOGY

The carotid body was first described by Von Haller in 1743 as the 'ganglion minutum'. It is situated in the carotid bifurcation, surrounded by a capsule which sends fibrous septa into the gland, subdividing it into lobes and lobules. It is supplied, usually from the external carotid artery, through the ligament of Mayer, which attaches it to the bifurcation. The degree of vascularization of the tumour varies very much, with a consequent variation in the consistency of the tumour.

Histologically the normal carotid body consists of polyhedral cells with finely granular cytoplasm, and round or oval, dark, eccentric nuclei. The cells are pervaded by a rich network of capillaries which may show sinusoidal dilatation.

The carotid body functions as a chemoreceptor, playing a part in the control of respiration. It is probably not called into play under normal physiological conditions, 'but as a last line of defence against respiratory failure' (Best and Taylor).

Boyd[1] has shown that the carotid body develops in the adventitial layers of the artery and that, in the mature state, it maintains this relationship. Morfit *et al.*[16] and Byrne[23] emphasize that tumours developing from the cartoid body preserve this relationship, even in the most advanced stage. This is obviously of very great importance from the surgical point of view, because it enables the surgeon to dissect the tumour from the artery in the subadventitial plane, leaving the tunica media inviolate. Gordon-Taylor[6] has described the 'white line' of demarcation which can be demonstrated by very careful dissection.

PATHOLOGY

The carotid body tumour lies in the fork between the internal and external arteries, splaying them apart (Fig. 1). The constituent cells are usually arranged in sheets, but may on occasion show an adenomatous or peritheliomatous arrangement. Great difficulty arises in the attempt to assess histologically malignancy of these tumours. It is apparent from numerous reports in the literature that precise histological criteria of malignancy in these tumours are practically impossible to determine so that more reliance must be placed on follow-up studies to predict their clinical behaviour.

It is in this aspect that there are such conflicting reports. Le Compte,[12] reporting under the auspices of the Subcommittee on Oncology of the National Research Council in America, states that the great majority of these tumours are both clinically and histologically benign, so that it is doubtful whether anything more than a diagnostic biopsy should be done in the symptomless and slowly growing tumours. Lahey and Warren[10] state that malignancy, when it occurs (in 15-20% of cases), is of low grade with involvement of local lymph nodes, but no proved haematogenous dissemination. Harrington, Clagett and Dockerty[8] found 50% (10 of 20) of their cases to be malignant. Monro[15]

stated the incidence of malignancy to be 12% in the cases he reviewed.

The ability of these tumours to produce distant haematogenous metastases, which would constitute unequivocable proof of their malignant potentialities, has been hotly disputed by many authors. Morfit *et al.*[16] have collected a formidable body of evidence from the literature in support of the view that these tumours can, and do, spread by the blood stream. Thus Donald and Crile[3] report a case which spread to the vertebrae, ribs, manubrium and ilium. Goodof and Lischer[5] had a case which spread to the pancreas. Prendergrass and Kirsch[18] report spread to the pelvis, femur, ribs and sternum. Spotnitz[21] reports spread to the cervical glands, skin, kidneys, pancreas, heart and pleura. Grönberger[7] studied a case which spread to the kidney and mediastinum. The case of Gilford and Davis[4] metastasized to the liver. Authors have objected to many such cases on the grounds of inadequate date supplied, or, in some cases, erroneous interpretation of histological appearances. Morfit *et al.*,[16] however, report one of their patients who died with metastases to the heart, lungs, ribs and vertebrae after resection of an advanced primary growth. Sections from these metastases were circulated to many leading pathologists in America, and these concurred, without exception, in the diagnosis of metastases from a carotid body tumour.

This evidence of distant dissemination would appear to be irrefutable; and if one further considers Monro's observation[15] that in 30% of cases left untreated, or treated inadequately, e.g. by curettage, death was directly attributable to the tumour, the direct bearing these facts have on the aggressiveness with which the tumours should be approached becomes apparent.

CLINICAL PRESENTATION

1. *The Swelling*

A carotid body tumour usually presents as a symptomless, very slowly growing lump in the upper anterior triangle of the neck. The lump is round or oval, and characteristically can be moved fairly freely in a lateral direction, but hardly at all in a vertical direction. Monro[15] emphasizes a great variation in the consistency of these tumours, depending on the degree of vascularization. They are usually solid, but, if vascular enough to appear cystic, they should manifest true expansile pulsation, making differentiation from branchial cysts relatively easy. An aneurysm may be closely simulated, hence the value of angiography (see below). In the usual solid type, the pulsation is of the transmitted type.

A very important physical sign is the relationship of the carotid arteries to the tumour. In 1938 Shawan and Owen[20] observed that the external carotid artery can be palpated over the outer surface of the tumour. This was re-emphasized by Vaughan-Hudson in a personal communication to Monro:[15] 'It is the only tumour of this region in which a large vessel can be felt pulsating in front of the tumour.' The internal carotid artery is displaced posteriorly and laterally to the tumour, and in the case presented below, the external and internal carotids respectively could be felt distinctly anterior and posterior to the tumour. In fact, with a thumb and forefinger in these positions, an impression of expansile pulsation was obtained, whereas direct palpation of the outer surface of the tumour with one finger revealed no pulsation whatever.

2. *Thrill, Bruit and Compressibility*

The presence of these signs also depends on the degree of vascularity of the tumour. Compression of the common carotid artery may cause a decrease in size of the tumour if it is vascular enough. These features were present in only 3 of the 18 cases reported by Lahey and Warren.[10]

3. *Pressure on Adjacent Structures*

A. *Nerves.* Palsies of the recurrent laryngeal, the cervical sympathetic (Horner's syndrome), hypoglossal and spinal accessory nerves, have all been reported, but occur rarely.

B. *The carotid sinus.* A carotid-sinus syndrome is uncommon in these tumours. Byrne[23] found it in 3 of his 13 cases. One might expect this syndrome more commonly than it occurs in view of the anatomical situation of the tumour, but the sensitivity of the sinus is probably the determining factor.

C. *Pharynx.* The tumour may bulge into the pharynx and cause dysphagia.

DIAGNOSIS

The clinical features described above should enable a correct diagnosis to be made in the majority of cases if the condition is kept in mind. The slow growth and long history exclude neoplastic and inflammatory lymph-node swellings in many cases, but the differentiation is more difficult in the early case. A branchial cyst should seldom cause much difficulty, but the very vascular type may be confused with an aneurysm.

Biopsy. A formal biopsy will certainly confirm the diagnosis, but the difficulty in deciding histologically whether the tumour is benign or malignant has been mentioned above, since mitoses and bizarre forms are rare and the usual criteria for malignancy are absent (Byrne[23]). In the authors' opinion arteriography is a much more valuable diagnostic procedure.

CAROTID ANGIOGRAPHY

Monro[15] maintains that carotid angiography plays little or no part in the diagnosis of carotid body tumours. Wetzel,[22] on the other hand, maintains that angiography may play a useful role, not only in the diagnosis of carotid body tumours, but also in the diagnosis of other swellings in this region, especially aneurysms.

This wide divergence of opinion regarding the place of angiography in the diagnosis of carotid body tumour may be explained in part by the paucity of recorded cases. Thus a review of the literature reveals that the first angiographic demonstration of a carotid body tumour was by Lichtenauer,[13] the angiogram having been performed during the course of the operation for removal of the tumour. Thirteen years were to elapse before the next reported cases were published in 1951 by Idbohrn.[9] This author reported 2 cases with preoperative angiograms, using the percutaneous technique, and another case where angiography was carried out at operation. In 1957 Wetzel[22] reported a further percutaneous angiographic demonstration of the tumour, and finally in 1958, Lipshitz[14] recorded a further case. The case presented here is the seventh recorded angiographic demonstration of a carotid body tumour.

The angiograms demonstrated (Figs. 1-5): (1) Displacement of the left common carotid artery in a lateral direction, (2) marked splaying of the carotid bifurcation, (3) marked displacement of the internal carotid artery, laterally and

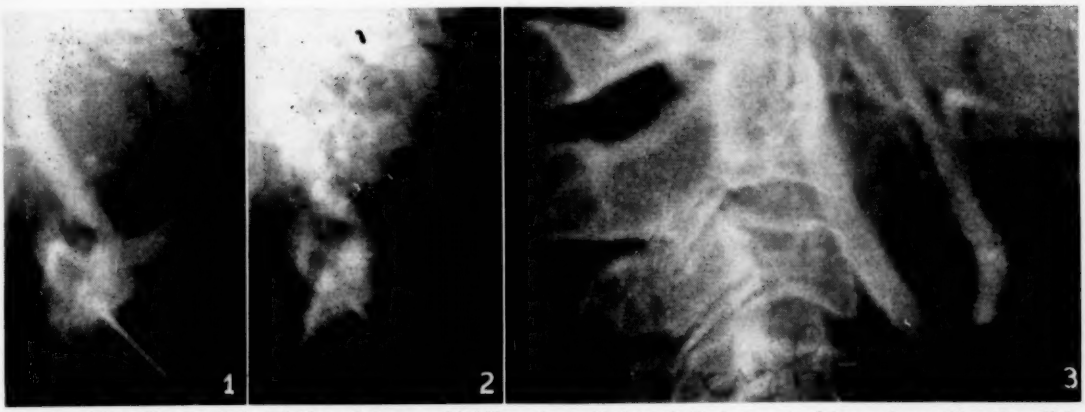

Fig. 1. A.P. Characteristic splaying of the carotid bifurcation with lateral displacement of internal carotid and medial displacement of external carotid. *Fig.* 2. Well-marked vascularity of the tumour. *Fig.* 3. Lateral view. Anterior displacement of the external carotid artery and posterior displacement of the internal carotid artery.

posteriorly, (4) displacement of the external carotid artery, medially and anteriorly—the displacement of this artery is not as marked as that of the internal carotid artery and (5) an extremely rich blood supply to the tumour. The blood supply appears to be wholly derived from the external carotid and consists of well-formed blood vessels with pooling and a 'blush' phenomenon.

The most significant feature of the above appearance is the striking similarity to previously reported cases. The splaying of the artery, the displacements, and the extremely rich blood supply, appear to constitute a characteristic picture. The authors thus feel that, with this characteristic picture, angiography plays a useful role in the early diagnosis and differentiation from other vascular swellings, especially aneurysms.

Furthermore, angiography is extremely useful in demonstrating the size, extent and relations of the tumour to the carotid arteries, which may be of great assistance to the surgeon. In addition, any anomaly of the circle of Willis can be demonstrated at the same examination, and by means of the well-known cross-circulation test, a rough guide to the collateral circulation through the circle of Willis may be obtained, although the latter is not absolutely reliable (see below).

Finally, by examination of the findings in a sufficiently large number of cases, angiography may provide some help in differentiating the benign from the malignant tumours, bearing in mind that there are well established criteria for doing this in cerebral tumours. This would appear to be a field worthy of further study, in view of the limited value of biopsy.

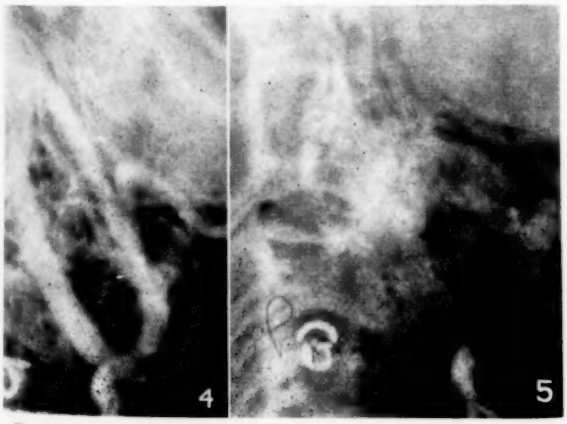

Fig. 4. The rich blood supply to the tumour.
Fig. 5. The blood supply demonstrates a 'blush' phenomenon due to pooling of dye in the highly vascularized tumour.

Radiographic Technique

The examination is carried out on the Lysholm skull table. Conventional A.P. and lateral projections are employed. Note that in the A.P. projection, the tube of the skull table is tilted away from the head to its maximum extent, compared with the 30° tilt to the head (Townes) used in cerebral examinations. This is done in order to obtain a bone-free projection of the carotid bifurcation. 10 ml. of 60% urografin is used, as in cerebral angiography.

The timing of the films calls for special comment. The first film, the arterial phase, is exposed early in the injection, when approximately half the dye in the syringe has been injected. This is in direct contrast to cerebral angiography, where the first film is exposed when three-quarters of the dye has been injected. The reasons for the early exposure are: (*a*) the proximity of the tumour to the site of injection and (*b*) the extreme vascularity of the tumour.

It is also advisable to delay the subsequent films by about 4 seconds each in order to display the 'pooling' and 'blush'. This delay also enables adequate visualization of the cerebral circulation to be achieved.

TREATMENT

It is well established that carotid body tumours, if left untreated, or treated inadequately, can kill the patient. This happens in 30% of cases according to Monro.[15] The development of blood-borne metastases has also been proved. For these reasons it might be thought that an aggressive attack on these tumours was indicated in every case. The difficulty lies in the total reported mortality associated with surgery,

ranging from 15 to 30%. Monro[15] found the mortality in cases dissected off the carotid bifurcation to be 6·4%, compared with a mortality of 29% if the bifurcation was resected. Lahey and Warren[10] lost 2 of their 6 cases in which a 'triple ligation' was done. It is noted that even when they were able to dissect the tumour off the bifurcation, 1 of 5 cases died from a post-operative thrombosis of the internal carotid artery.

Morfit *et al.*,[16] Byrne[23] and Gordon-Taylor[6] have all made a plea for the sanctity of the carotid bifurcation, and have emphasized the feasibility of removing the majority of these tumours without sacrificing the bifurcation. If the tumour is approached in the sub-adventitial plane, aided, if necessary, by the infiltration of a local anaesthetic, a patient and meticulous dissection enables this to be done. Even if the main arterial trunk is damaged, ligation of all the major vessels should never be carried out (Morfit *et al.*[16]). On many occasions repair of a hole in the artery has been performed satisfactorily. If this is not possible, an end-to-end anastomosis between common and internal arteries should be considered. If neither of these methods is feasible, a graft must be used. However Morfit *et al.*[16] have never had to resort to this.

Various methods have been described to assess pre-operatively the adequacy of the collateral circulation across the circle of Willis, in case the carotid bifurcation has to be sacrificed. The Matas manoeuvre of compressing the common carotid artery against Chassaignac's tubercle and observing whether cerebral symptoms appear, has been found to be unreliable by many authors. Lahey and Warren[10] lost 2 of 6 cases who had successfully withstood periods of compression lasting 10 minutes 3 times a day. Lambert Rogers[19] combined this method with electro-encephalography to detect slighter degrees of cerebral ischaemia. Angiography has been mentioned above, but is likewise not foolproof.

Attempts to improve the cerebral collateral circulation either by intermittent digital compression of the carotid arteries or by the preliminary application of a ligature or Crile's clamp round the carotid artery under local anaesthesia (Dandy[5]) are also unreliable. Morfit *et al.*[16] report a case in which a Crile clamp was progressively screwed down over a 10-day period, without any effect, only for the patient to lapse into coma after one further turn of the screw on the 11th day. He concludes that 'there is no method currently available to make carotid ligation safe'.

It is to be noted in passing that carotid artery ligation for neoplasm carries a far greater risk than ligation for intracranial aneurysm. In neoplasm mortalities of 19-58% have been recorded, as compared with 4 - 5·1% inintracranial aneurysm.

In view of the fact that the onset of hemiplegia following resection of the bifurcation may be immediate, or delayed for several days, it has been suggested that thrombosis of the internal carotid artery is responsible for the neurological sequelae. The reason for the thrombosis is stated to be the long (17 cm.) segment without any branches between the bifurcation and circle of Willis. In an attempt to prevent this thrombosis, Pemberton and Livermore[17] used post-operative anti-coagulants in 4 cases after resection of the bifurcation, without mortality. Morfit *et al.*[16] however, state that autopsy studies have seldom demonstrated thrombosis of the distal arterial segment, and that, while anti-coagulants may possibly increase the factor of safety, they certainly do not eliminate the dangers inherent in ligation.

To summarize the position at present, we may conclude that the natural history of these tumours makes their removal desirable as a general principle. Resection of the carotid bifurcation carries a prohibitive mortality, and should never be done. In view of the fact that the carotid body develops in the adventitia of the artery, and that even advanced tumours do not invade the media, meticulous dissection in a sub-adventitial plane will usually leave the bifurcation inviolate. In the few cases where this is not possible, restoration of arterial continuity is mandatory. The following case, however, demonstrates the role of extraneous factors in determining the plan of management.

Case Report

Mr. W., aged 57 years, was admitted to the Johannesburg General Hospital in May 1958. Fifteen years previously he had accidentally discovered a small lump in the left side of the neck. This lump slowly and progressively increased in size throughout the years. Shortly before admission he noticed a certain amount of local discomfort, and also pain in the back of the neck. For 2-3 years he had been having frequent severe frontal headaches. There was no hoarseness or dysphagia.

Examination. A large, rather obese, plethoric looking man, with an oval swelling, 1½ inches by 1 inch, situated in the left anterior triangle of the neck below and behind the angle of the jaw. The lump was firm and smooth and exhibited the type of pulsation described above. The common carotid artery could be traced to the lower pole of the tumour, which was felt to be embraced anteriorly and posteriorly by 2 large arterial trunks. There was free lateral mobility but hardly any vertical mobility. There was no bruit or thrill over the tumour, and no cranial nerve palsies. The left pupil was a trace smaller than the right, but no Horner's syndrome was present. His blood pressure was 170/110 mm. Hg. The patient was also polycythaemic, his haemoglobin being 22·2 g.%. An arteriogram showed the features described above and illustrated in Figs. 1-5.

Management. A firm clinical diagnosis of carotid body tumour was made, and the diagnosis was confirmed by arteriography. The patient made things easy by refusing operative treatment, but if he had consented to operation, we should have been faced by the difficult decision between the general desirability of removing the tumour and the undoubted additional risks in his particular case on account of his age, hypertension and polycythaemia. The case of Lahey and Warren,[10] in which a fatal post-operative thrombosis of the internal carotid artery occurred after dissection of the tumour off the artery, has been quoted, and this patient's polycythaemia would probably increase the chances of post-operative thrombosis. All in all, the hazards of operation in this particular case appeared to outweigh the possible advantages.

SUMMARY

1. The anatomy and development of the normal carotid body, and the pathology, clinical presentation and treatment of carotid body tumours, are reviewed.

2. Of these tumours 12-15% are clinically malignant. Spread to lymph nodes and by the blood stream has been established.

3. Histologically, criteria of malignancy are notoriously difficult to establish, severely limiting the value of biopsy.

4. In principle, carotid body tumours should be removed, but resection of the carotid bifurcation carries a prohibitive mortality. In the majority of cases the tumour can be dissected off the carotid vessels, in view of the fact that it develops in the adventitia of the artery, and does not invade the media even in advanced cases. If the main arterial trunk is damaged, continuity must be restored by arteriorrhaphy, end-to-end anastomosis, or insertion of a graft.

5. There is no certain way of predicting a successful outcome to bifurcation resection. Methods designed to increase the cerebral collateral circulation are unreliable.

6. The role of arteriography in the diagnosis is discussed. The tumours present a characteristic angiographic appearance. A plea is made for the wider use of angiography in the diagnosis of swellings in the upper neck, especially those swellings that appear pulsatile and related to blood vessels.

7. A case is presented showing the typical features of carotid body tumour and illustrating the fact that, whereas removal of these tumours is generally desirable, each case must be considered on its merits. In certain circumstances the hazards of removal outweigh the dangers inherent in leaving a potentially malignant tumour *in situ*.

We wish to thank Prof. D. J. du Plessis and Dr. Josse Kaye for their interest and encouragement. We also wish to thank Miss Tomkins for the reproductions.

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TREATMENT OF ABRUPTIO PLACENTAE*

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Until the exact cause of premature separation of the placenta is known, there will be a wide divergence of opinion on the treatment of abruptio placentae. Important advances have, however, recently been made, such as the identification of a correctable haemorrhagic diathesis due to hypofibrinogenaemia or afibrinogenaemia, and the introduction of the Bull regime of treatment of postpartum oliguria. These recent advances will probably save some lives, but in the majority of cases we are still faced with the problem of basic treatment, and the question often confronts us whether to induce labour, and whether to perform Caesarean section.

Almost in despair then, one is forced to analyse the results of treatment in large series of cases. In spite of many recent articles on the aspects of afibrinogenaemia and hypofibrinogenaemia, there is still a scarcity of reports of large series.

The present analysis is of a series of 688 cases of accidental haemorrhage; 653 having occurred in the Department of Obstetrics and Gynaecology at the University of Cape Town from 1949 to 1953, and 33 in the Department of Obstetrics and Gynaecology of the University of Stellenbosch during 1957. They are presented together because the basic approach in these cases has been similar in spite of their having been treated in different hospitals and by different consultants. I wish to thank Prof. J. T. Louw, of the University of Cape Town, sincerely for permission to present this analysis.

Grading of Abruptio Plancentae

The cases have been graded as recommended by Page, King and Merrill,[5] whose method is summarized in Table I. When bleeding is fairly marked in grade 2, it corresponds to the so-called revealed accidental haemorrhage. In grade 3 there may be no external bleeding, but in rare instances a case may present with marked bleeding.

The clinical grading is made on the supposition that the amount of placental separation is proportional to the clinical signs. There are, however, some pitfalls in this assumption. For instance, abdominal tenderness and rigidity may be minimal in marked cases of retroplacental haemorrhage when the placenta is situated posteriorly. Moreover, the differentiation between grade 2 and grade 3 is sometimes very difficult, for signs of shock are often difficult to interpret in this condition. It is, for instance, well known that these patients, although severely shocked, may not show tachycardia; and a normal blood pressure may be misleading when it occurs in a shocked patient who has previously been hypertensive.

TABLE I. GRADING OF ABRUPTIO PLACENTAE

	Grade 1	*Grade* 2	*Grade* 3
External bleeding ..	Slight	More to marked	Slight
Abdominal tenderness and rigidity	None	Slight to moderate	Marked
Foetal heart sounds ..	Usually present	Present in 40-50%	Absent in 98%
Shock	Absent	Absent	Present

By this classification the number of cases occurring in the different grades, are as shown in Table II.

Prophylactic Treatment: Antenatal Care

O'Donel Browne[2] stated in 1952 that the improvement in antenatal supervision had produced disappointing results as regards abruptio placentae. He found that the percentage of foetal mortality was exactly the same in booked as in non-booked cases. In this series, in grade 2 there was a foetal mortality of 67% in non-booked cases as against 53% in booked cases.

In grades 2 and 3 there were 107 non-hypertensive cases, and in these cases antenatal supervision obviously could have made no difference. There were, however, 211 cases in grades 2 and 3 (i.e. 66%), where antenatal care, hypotensive drugs and earlier induction might possibly reduce the incidence of accidental haemorrhage. In this respect it should be noted that the average time of onset of accidental haemorrhage in the 19 patients of grade 2 and 3 in series B

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TABLE II. CLASSIFICATION IN GRADES

Series	Grade 1			Grade 2			Grade 3		
A	Hypertensives	129	354	Hypertensives	91	156	Hypertensives	109	143
	Non-hypertensives	255		Non-hypertensives ..	65		Non-hypertensives ..	34	
B	Hypertensives	5	14	Hypertensives	6	10	Hypertensives	5	9
	Non-hypertensives	9		Non-hypertensives ..	4		Non-hypertensives ..	4	
Total			368			166			152

Series A = 1949-1953. Series B = 1957. Grades 2+3: Hypertensives 211 (66%), non-hypertensives 107 (33%).

was 35 weeks. In 12 patients it occurred before 37 weeks, and in 7 patients after 37 weeks. It is also interesting to note that there were 6 maternal deaths from renal causes; all 6 patients were hypertensive, and all 6 were non-booked cases. Under these circumstances I feel that in Bellville and Cape Town strict antenatal care should be able to make some contribution towards lessening the incidence of abruptio placentae.

Treatment of Grade 1

Most authorities are agreed that conservative treatment is possible in the grade-1 type of case. It should be noted, however, that the foetal mortality, even in grade 1, ranges from 14% in series B to 20% in series A; this corresponds to the figure of 15% as reported by Townsend[8] in 1957. Hospitalization of these patients is therefore advised. A close watch should be kept on the foetal heart. One should be able to perform Caesarean section immediately if foetal distress develops in the first stage of labour, or a forceps delivery in the second stage of labour.

TREATMENT OF GRADES 2 AND 3

A. *Treatment for the Sake of the Baby*

(*a*) In grade 3, where the amount of separation is so much that it causes shock in the patient, it usually causes the death of the baby simultaneously. However, very rarely, cases may be found where foetal heart sounds are still heard. In this series there were 3 such cases. After shock had been treated, a Caesarean section was immediately done, but only one baby survived.

(*b*) In grade 2 the foetal mortality was 61·8%. Of a total of 170 cases, 65 babies survived, 85 babies were stillborn, and there were 20 neonatal deaths (Table III).

TABLE III. FOETAL MORTALITY IN GRADE 2

Series	Cases	Survived	Still-born	Neonatal Death	Total Died	% Died
A ..	160	59	83	18	101	63
B ..	10	6	2	2	4	40
Total ..	170	65	85	20	105	61·8

The obvious question one asks oneself here is whether Caesarean section is not indicated in every case in grade 2 in which the foetal heart is heard on admission? There are certain findings from this series (Table IV) which do not inspire one with enthusiasm to do routine Caesarean sections on all patients in which the foetal heart is heard:

TABLE IV. RESULTS IN 97 GRADE-2 CASES WITH FOETAL HEART HEARD ON ADMISSION

Caesarean section (17 cases)	Neonatal death	8
	Survived	9
Vaginal delivery (80 cases)	Stillborn	12
	Neonatal death	12
	Survived	56

Of 12 stillborn babies 9 could possibly have been saved by Caesarean section.

(*a*) 17 Caesarean sections were done for various reasons in cases in which the foetal heart was heard on admission, and only 9 babies survived, so that even with such a policy there would be an inevitable foetal loss.

(*b*) There were only 12 cases of 97 in which the foetal heart was heard on admission, and in which a vaginal delivery resulted in a stillborn baby. From close scrutiny of the case records, it is concluded that Caesarean section could possibly have saved 9 babies, but an unknown number might have died neonatally. There were 97 cases in which the foetal heart was heard on admission, and in 56 of these cases, vaginal delivery resulted in a liveborn baby which survived (i.e. 58%).

In practice therefore, in this series a policy of Caesarean section in each case in which the foetal heart was heard would have meant that 80 more Caesarean sections would have had to be done to save a possible maximum number of 9 more babies. In 56 cases the operation would definitely have been done unnecessarily, for in fact there were 56 babies who were born alive vaginally and survived. Under these circumstances I feel that there is no justification for a policy of routine Caesarean section on all cases in grade 2 in which the foetal heart is heard.

However, as the foetal mortality is undoubtedly very high, I feel that a Caesarean section is justified in selected cases, e.g. the 'very important baby'—when pregnancy has occurred after a long period of involuntary infertility. We are also now doing Caesarean sections in cases with hypertension and albuminuria who are not in labour, and where the baby is a reasonable size. This is done on the presumption that these babies are more sensitive to the relative anoxia which occurs as a result of the separation of the placenta.

In cases in which a vaginal delivery is allowed, it is imperative to keep a very close check on the foetal heart, and to prepare the theatre for an immediate Caesarean section should any signs of foetal distress become apparent.

Even with the most careful attention however, some babies will still be lost, for on occasion the foetal heart just suddenly disappears.

B. *Treatment for the Sake of the Mother*

The treatment applied in both series A and series B is basically the same, viz. a basic conservative approach. The patient is sedated and a blood transfusion given where necessary. During the course of time, however, a change of attitude has occurred concerning artificial rupture of the membranes. This has now become a routine part of the treatment. It stimulates labour and decreases the external bleeding when it is marked. Wiener[9] holds that it also lessens shock and prevents afibrinogenaemia from developing. Only in selected cases is Caesarean section performed.

According to Table V, 9 mothers died out of 318 in grades 2 and 3, i.e. 2·8% of all cases in grade 2 and 3 (or 3·5% of

TABLE V. TREATMENT IN GRADES 2 AND 3

Grade	Treatment	Total	Maternal Deaths: Renal	Maternal Deaths: Postpartum Bleeding
2	Conservative (39 blood transfusions)	122	2	2
	Artificial rupture of the membranes	27	0	0
	Caesarean section	17	0	0
3	Conservative (92 blood transfusions)	108	3	1
	Artificial rupture of the membranes	31	1	0
	Caesarean section	13	0	0
	Total	318	6	3

cases in which the baby died). This can be compared with a maternal mortality of 11·5% in a series reported by Sexton[6] in 1950, and of 10·7% in a series reported by Sheehan and Moore,[7] also in 1950. The following deductions can be made from this table:

1. Artificial rupture of the membranes on its own carries no extra risk for the mother. There was no case in which the general condition of the patient deteriorated as a result of artificial rupture. There was 1 maternal death in 58 cases in which the membranes were artificially ruptured, and it is doubtful whether the procedure contributed in any way to her death; she died 8 days later of a renal cortical necrosis.

2. Caesarean section in selected cases is a safe procedure. There were no maternal deaths in 30 Caesarean sections.

Indications for Caesarean Section

The indications in the 30 cases in this series in which casaerean section was performed are shown in Table VI.

TABLE VI. CAESAREAN SECTIONS

Grade	Total Cases	C.S. for Mother: Cases	C.S. for Mother: Indications	C.S. for Baby: Cases	C.S. for Baby: Survivals	Total C.S. Cases
2	166	6	Not in labour (3) Disproportion (1) ? Placenta praevia (2)	11	6	17
3	152	10	Not in labour (4) Oliguria or general deterioration (6)	3	1	13
Total	318	16		14	7	30

In order to consider the efficacy of this treatment for the mother, I shall deal with the maternal deaths in this series.

MATERNAL DEATHS

(a) *Oliguria (Table VII)*

Six patient died with postpartum oliguria.

Post-mortem findings. In 2 cases bilateral renal cortical necrosis was present—one patient died 6 days *post partum*, and the other 10 days *post partum*. They was both treated with one or other modification of the Bull regime involving reduced fluid intake. However, it is unlikely that any form of postpartum treatment would have altered the course of their illness. The post-mortem findings in another case were arteriolar necrosis as with malignant hypertension and, in another case, sub-acute glomerular nephritis. In the fifth case no cause of death was found, but for 6 days she had been receiving more than 4,000 ml. fluid intravenously. This was in the days before the Bull regime was started. The pulmonary oedema was probably the cause of death. In the sixth case a post-mortem was refused.

It is of interest to note that all these 6 patients were hypertensive. They were all emergency admissions—one patient died undelivered, whilst the other 5 were all delivered vaginally.

Here again, an important question is whether Caesarean section could possibly have saved the lives of any of these women. In 4 of the 6 cases it is unlikely that Caesarean section could have made any difference, since they were admitted in labour and they were delivered 1 hour, 6 hours, 6 hours and 9 hours respectively after admission. The fifth patient was admitted in a condition of irreversible shock, and died 9 hours after admission. In the remaining patient a Caesarean section might possibly have been beneficial. Although admitted in labour, she was only delivered 18 hours later, during which time she excreted only 2 oz. of urine.

It does, however, seem as if these patients were not transfused with adequate amounts of blood in the antepartum period. Only 3 of the 6 patients received any blood *ante partum*, whilst the amounts (1 pint, 1 pint and 2 pints respectively) were probably insufficient. One possible reason for this is that one is hesitant to give too much blood to a hypertensive patient. The problem is even more difficult with the non-booked hypertensive patient whose blood pressure before the accidental haemorrhage occurred is not known. With recovery from the shock following the initial blood transfusion, the blood pressure starts rising to perhaps 160/100 or higher, and one becomes hesitant to give more blood. Yet the patient may have lost 3 or 4 pints retroplacentally, which should be replaced.

We are now laying great stress on giving enough blood rapidly in order to prevent further shock and oliguria, and every patient with grade-3 abruptio placentae is given at least 2 pints of blood rapidly. Feeney[8] advises a minimum of 3 pints. Also, where so many of these cases are unbooked cases, there is a definite value in a 'flying squad' being sent to the patient so that a blood transfusion can be started in her home. In this way there is less delay in the treatment of the shock.

Where anuria, or oliguric excretion of less than 1 oz. per hour, occurs in spite of adequate transfusion, we believe that the uterus should be emptied. If the patient is not in strong labour, and her general condition is satisfactory, a Caesarean section is performed with an extradural block anaesthetic. We have no experience of bilateral splanchnic block as advised by Feeney.

With reference to the importance of giving enough blood, I should like to quote a paper of Townsend[9] from Melbourne. In his series of 158 patients, with severe grade-2 and grade-3 placental separation—*all* of whom had blood transfusion rapidly—there were only 2 cases of postpartum oliguria and *no* maternal deaths. There were only 7 Caesarean sections, performed for associated conditions, viz. severe pre-eclampsia, transverse lie, prolapsed cord, previous C.S., foetal distress first stage, unconfirmed placenta praevia (2 cases). One could hardly better such a series. Townsend suggests that his good results, and the low incidence of oliguria, are due to his regime of giving enough blood and giving it rapidly.

Perhaps the new work being done on serotonin estimation may throw light on the renal pathology which will make prophylactic treatment easier.

TABLE VII. FATAL CASES WITH OLIGURIA

Year	Parity	Age	Antenatal	Adm. in Labour	Between Admission and Delivery	Duration Pregnancy	B.P. (mm. Hg)	Alb.	Blood Transfusion	P.P.B.	Day of Death	P.M.	Remarks
1949	Gr.10 P.9	37	Non-booked	Yes	1 hour	34 weeks	170/110	2+	None	+	6th	Pulmonary oedema. No kidney lesion.	Too much intravenous fluids.
1952	Gr.1	28	Non-booked	Yes	18 hours	34 weeks	170/100	4+	2 pints antepartum	—	6th	Refused	Bull regime.
1952	Gr.12 P.11	56	Non-booked	Yes	6 hours	32 weeks	180/110	4+	4 pints postpartum	+	10th	Arteriolar necrosis as with malignant hypertension	Bull regime.
1952	Gr.5 P.1	38	Non-booked	Yes	6 hours	26 weeks	190/130	4+	None	—	6th	Bilateral renal cortical necrosis	Bull regime.
1953	Gr.4 P.2	30	Non-booked	?	Died undelivered	35 weeks	160/130	4+	1 pint antepartum		9 hrs. after admission	Subacute glomerulonephritis	Irreversible shock.
1957	Gr.4 P.2	34	Non-booked	Yes	9 hours	34 weeks	175/120	4+	1 pint	—	10th	Bilateral renal cortical necrosis	Bull regime.

TABLE VIII. FATAL CASES WITH POSTPARTUM BLEEDING

Year	Age	Parity	Antenatal	Baby	Blood Transfusion	Death	Treatment	P.M.	Remarks
1950	39	Gr.9 P.7	Non-booked	Stillborn	3 pints antepartum 16 pints postpartum	17 hours postpartum	Blood and uterus packed	Eclamptic liver	Uterus was well contracted.
1952	37	Gr.4 P.3	Non-booked	Alive	Blood postpartum	3½ hours postpartum	Blood and oxytocics	Anterior pituitary necrosis.	Bleeding controlled 1 hour before death.
1952	29	Gr.2 P.0	Booked	Stillborn	3 pints under pressure postpartum	3 hours postpartum	Blood and oxytocics	No abnormality.	

INCIDENCE OF POSTPARTUM BLEEDING

Grade 2: 55 out of 166 (33·1%)
Grade 3: 67 out of 152 (44%)
In last 19 cases Grade 2 and 3 (1957): there were 5 cases (26%) with 1 case of hypofibrinogenaemia.

The Postpartum Bleeding Group (Table VIII)

Three patients died with postpartum haemorrhage, the last death having occurred in 1952. No cases of hypo- or afibrinogenaemia were diagnosed before 1953. In the last 19 cases of grades 2 and 3 (in 1957), one case of hypofibrinogenaemia was found. However, it was not necessary to administer fibrinogen, for the blood clotted satisfactorily after 3 pints of blood had been transfused.

In the last 19 grade-2 and grade-3 cases in the series under report (occurring in 1957) there was still an incidence of 26% of postpartum bleeding, as against a 5% over-all incidence in the institution. This is also in spite of adequate antepartum blood transfusion and the administration of ergometrine and hyalase at the time of the birth of the anterior shoulder. However, only one case was very severe. The very severe cases of postpartum bleeding can usually be linked with a haemorrhagic diathesis due to a defect of blood clotting. To treat the postpartum bleeding it is merely necessary to correct this bleeding tendency with blood or fibrinogen, and there is no longer any necessity to do hysterectomies in this condition.

There is a difference of opinion about the incidence of blood-clotting defect in abruptio placentae. Townsend[8] reports an incidence of 3 in 150 moderate to severe cases, whereas Barry *et al.*[1] report that a degree of blood-clotting defect is present in every case of abruptio placentae where there is abdominal tenderness. Maisel and Cartnick[4] report from America that in 31,488 deliveries there were 6 cases of afibrinogenaemia necessitating fibrinogen therapy.

In practice it is found either that the blood fails to clot or that, even if it does, then a fragile type of clot is formed which dissolves in the serum within an hour. It has been shown that this clotting defect is due to a decrease of circulating fibrinogen to below 100 mg.% (the normal is ± 300 mg.%). This is correctable by giving double-strength plasma or blood, but in severe cases fibrinogen has to be given. Anything from 1 g. to 6 g. may be necessary. I have personally dealt with a case (with normal fibrinogen content) where the clotting defect was due to a factor-5 deficiency (not in this series). This is correctable only by transfusing freshly drawn blood, and in this case the clotting took place after 2 pints of fresh blood had been transfused.

It is also important to remember that it is better not to give dextran, because the large molecules may precipitate fibrinogen and cause a hypofibrinogenaemia.

MANAGEMENT OF SEVERE CASES

In conclusion, a short summary of the present management of severe grade-2 and grade-3 cases is given:

1. The patient is handled gently, morphine, gr. ¼, is injected, and oxygen is given by inhalation mask.

2. Blood is taken for grouping and cross-matching, and a coagulation test done. If a satisfactory clot forms in less than 10 minutes, there is no coagulation defect. The clot must be examined again after 1 hour for evidence of lysis. This test must be repeated frequently, especially if postpartum bleeding occurs later. Blood transfusion is started as soon as possible with blood as fresh as possible. While waiting for blood, we give intravenous glucose or plasma. If the blood does not clot, a quantitative test is done. Fibrindex is a useful and rapid rough test, while the Parfentjef test is an exact test which takes 20-30 minutes. If no improvement in the clotting takes place after 2 pints of blood have been given rapidly, it is probably wisest to give fibrinogen intravenously.

3. A rubber catheter is placed in the bladder, and excretion is charted hourly.

4. The membranes are ruptured in order to induce labour.

5. A vaginal delivery is awaited and a close check is kept on the pulse, the blood pressure, the abdominal girth and the foetal heart sounds (if present).

6. Caesarean section is performed for the baby's sake in grade 2 if the foetal heart is heard, the baby is a reasonable size, and the mother has hypertension and albuminuria; or if it is a 'very important baby' (e.g. elderly primigravida or long period of preceding involuntary infertility).

7. Caesarean section is performed for the mother's sake if she is not in labour and (*a*) there is diminished excretion of urine (less than 1 oz. per hour in spite of adequate transfusion), or (*b*) there is initial improvement which is not sustained and delivery does not seem imminent. One should first give more blood and then operate. In all cases where Caesarean section is done a check must be kept on the coagulability and the fibrinogen content of the blood. A Caesarean section is also performed when there is marked external bleeding not controllable by artificial rupture of the membranes.

8. For postpartum bleeding, oxytocics are given, and blood (fresh) and, if necessary, fibrinogen transfused.

9. For postpartum oliguria or anuria, 40% dextrose is given through a polythene catheter pushed into the inferior vena cava *via* the femoral vein. The daily amount is 600 c.c. plus the amount of fluid execreted or vomited. Vitamins are added, as well as heparin to prevent clotting. Sometimes alcohol also is added when more calories are needed. Testosterone is given by injection for its protein-sparing effect. For severe electrolytic imbalances dialysis with the artificial kidney is used.

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MEDICAL SERVICES PLAN

DRAFT CONSTITUTION AND RULES

1. The name of the Society is '*The Medical Services Plan*', which shall hereafter be referred to as the Plan.

2. The Plan shall have its registered office in the City of Johannesburg, Province of the Transvaal, Union of South Africa.

3. The objects of the Plan are:

(*a*) To organize and maintain an organization to provide medical services to members of the public on a non-profit making basis.

(*b*) To procure the services of Medical Practitioners under contract.

(*c*) To determine the basis upon which membership of the Plan shall become available to the public.

(*d*) To determine the basis of subscription, and to provide for the administration of the funds of the Plan.

(*e*) To provide for reciprocity with approved medical services plans of other countries to enable provision of medical services for members thereof while in the Union and for members of this Plan while outside the Union.

(*f*) To acquire, take on lease or otherwise acquire any real or personal property or moveable or immoveable assets which may be deemed necessary or convenient for the purpose of the Plan.

(*g*) To sell, mortgage, dispose of or otherwise deal with all or any part of the property or assets of the Plan, and to invest any monies of the Plan not immediately required for any of its objects in such manner as may be deemed requisite.

(*h*) To provide a fund for servants of the Plan to assist them, their widows and children, to provide gratuitous relief for persons who have been servants of the Plan.

(*i*) To take and accept any gift of property and money whether subject to any special trust or conditions and to procure contributions to funds of the Plan.

(*j*) To make known the nature and objects of the Plan.

(*k*) To secure the indemnification by way of insurance, or other means of the Plan or of its servants, or of medical practitioners participating in the Plan by rendering medical services, and any member of the Plan against any loss or damage arising out of or in connection with the giving or receiving or providing of medical services within the scope of the objects of the Plan.

(*l*) To do all such things as are incidental or conducive to the attainment of any of the aforegoing objects.

4. The Plan shall consist of three classes of members, namely:

(*a*) *Participating Members* who shall be registered medical practitioners who bind themselves to render professional medical services for the benefit of the members of the Plan upon such terms and conditions as shall be laid down by the Board of Directors.

(*b*) *Subscribing Members* shall be members of the public whose applications for membership have been accepted, and who pay subscriptions as laid down by the Board of Directors.

(*c*) Any person may be appointed an *Honorary Member* of the Plan in the discretion of the Board of Directors as defined in 11 (*b*).

5. Any member may resign from the Plan on written notice to the Board of Directors. Participating Members shall be entitled to resign on giving not less than six months' notice in writing to the Board of Directors.

6. The Board of Directors shall have the right to suspend or expel any member who, in the opinion of the Board, has been guilty of conduct detrimental to the interests of the Plan, or has been guilty of a breach of any of the provisions of the Constitution, or any bye-laws, rules and regulations framed by virtue of the Constitution of the Plan. No Participating Member shall be expelled or suspended except on a two-thirds majority vote of all Directors present at a meeting of Directors duly called, at which meeting such Participating Member shall have been given an opportunity of appearing to answer any allegations made against him. The Board of Directors shall have power to permit a Participating Member to be represented by Attorney or Counsel or both.

7. Membership shall terminate: (*a*) by death, (*b*) by resignation in terms of the Constitution, (*c*) by expulsion, or (*d*) where a member ceases to be qualified for membership.

A Member who shall have been suspended shall for the period of suspension lose all rights of membership.

8. *Rights and Obligations of Membership*

(*a*) Every Member shall be bound by, submit to and comply with the Constitution, Bye-laws and Rules and Regulations of the Plan for the time being in force.

(*b*) The right to vote and to attend all meetings of the Plan shall vest only in and is restricted to Participating Members and Honorary Members.

(*c*) Subscribing Members shall be entitled to all the benefits stipulated in their contracts with the Plan, as specified in the Bye-laws, and any additional benefits granted by the Board of Directors from time to time.

(*d*) All classes of members shall be bound by any decision of the Board of Directors.

9. *Meetings of Participating Members—General Meetings*

(*a*) The first Annual General Meeting shall be held within twelve (12) months from the date of incorporation of the Plan, and thereafter an Annual General Meeting shall be held once every calendar year within three months of the close of the previous financial year at such time and place as the Directors may determine.

(*b*) The Directors may, whenever they think fit, convene a Special General Meeting of the Plan, and shall convene a Special General Meeting upon the written requisition of not less than thirty-five (35) Participating Members.

(*c*) Fourteen (14) days prior to the Annual or any Special General Meeting, a notice specifying the time and place of the meeting, and in the case of special business the precise nature of the business, shall be given by prepaid post to each member at his last known address.

(*d*) Voting privileges shall be limited to Participating Members, Directors and Honorary Members.

(*e*) *Referendum.* The General Manager shall after each General Meeting of the Plan submit all resolutions to the Board of Directors. Should the Board of Directors be of the opinion that any Resolution passed at such meeting, other than a Special Resolution, may not properly represent the views of the Participating Members of the Plan, the Board of Directors may submit such Resolution to a referendum. Such referendum shall be governed by Rules and regulations framed by the Board of Directors.

The decision of the majority of the Members on such referendum shall be deemed to be the decision of the general meeting referred to.

10. *Proceedings at Meetings of Participating Members*

(*a*) The Chairman shall preside at all meetings or in his absence the Vice-Chairman, or if both are absent, the Members present shall appoint one of their number to preside at the meetings.

(*b*) Each member present shall be entitled to one vote. Votes of members shall be recorded in such manner as the Chairman of the meeting shall direct.

(*c*) No business shall be transacted at any General Meeting unless a quorum of members is present at the time when the meeting proceeds to do business. A quorum shall consist of twenty-five (25) members.

(*d*) If within one half-hour ($\frac{1}{2}$) from the time appointed for the meeting, a quorum is not present, the meeting shall stand adjourned to the same day in the next week at the same time and place, and if at the adjourned meeting a quorum is not present within one half-hour ($\frac{1}{2}$) from the time appointed for the meeting, the members present shall be a quorum. Notice of such adjourned meeting shall be advertised in at least two newspapers published in Johannesburg.

(*e*) If within one half-hour ($\frac{1}{2}$) from the time appointed for a Special General Meeting convened upon the requisition of Participating Members, a quorum is not present, the meeting shall be dissolved.

(*f*) All decisions at meetings shall be on a simple majority of the members present and entitled to vote. The Chairman may cast a deliberative vote, and in cases of equality of votes the Chairman shall exercise a casting vote. Voting shall be on a show of hands, unless a ballot is demanded by not less than five members present.

11. *Election and Removal of Directors*

(*a*) The first Board of Directors of the Plan shall consist of the members of the Steering Committee appointed by the Southern Transvaal Branch of the Medical Association of South Africa. The original Directors shall hold office until the first Annual General Meeting, and unless otherwise provided by the members in General Meeting, subsequent directors shall hold office for the terms hereinafter provided. The original Directors shall be eligible for re-election.

(*b*) Thereafter, the Board of Directors shall consist of fifteen (15) elected and nominated members. Six (6) shall be registered medical practitioners, nominated by the Council of the Southern Transvaal Branch of the Medical Association of South Africa. Six (6) shall be Participating Members elected by Participating Members. Three (3) shall be non-medical members elected by the twelve nominated and elected members referred to above, who shall be Honorary Members having full voting rights and their period of office shall be determined upon their election for periods not exceeding three years in each case.

(*c*) At the first Annual General Meeting of the Plan, the Participating Members shall elect, by lot, two (2) Directors to serve for a period of three (3) years and two (2) Directors to serve for a period of two (2) years, and two (2) Directors to serve for a period of one (1) year, and at subsequent annual meetings, Directors shall be elected to fill the offices of those whose terms are ending, and such shall hold office for a period of three (3) years.

(*d*) The Council of the Southern Transvaal Branch of the Medical Association of South Africa shall be invited to nominate annually six (6) members of the Board not later than nine (9) weeks before the Annual General Meeting.

In the event of the Council of the Southern Transvaal Branch of the Medical Association of South Africa failing to nominate six members by the due date, or should there be a shortfall in the number nominated, the members to be nominated or the shortfall shall be co-opted from the Participating Members by the Directors in office and these additional members so co-opted shall hold office for one (1) year.

(*e*) Any Participating Member of the Plan is eligible to be nominated to the office of Director; provided that such member be nominated by two (2) other Participating Members, and such nomination is received in the office of the Plan not later than eight (8) weeks prior to the Annual General Meeting.

(*f*) Election shall be by Postal Ballot Votes as prescribed in the Bye-laws, which shall be sent to all Participating Members, four (4) weeks before the Annual General Meeting, and must be returned to the office of the Plan properly filled in not later than one (1) week before the Annual General Meeting.

(*g*) Scrutineers for the counting of the ballot shall be appointed by the Board of Directors.

(*h*) A Director elected by the Participating Members of the Plan may be removed from office at any time by the affirmative vote of three-quarters ($\frac{3}{4}$) of the Members who are present at any General Meeting of the Plan; provided that written notice setting forth the reasons for the Director's proposed removal shall have been mailed to such Director at his last known address at least ten (10) days prior to the date of such meeting.

12. *Powers and Duties of the Board of Directors*

The control and administration of the Plan shall vest in the Board of Directors who may exercise all the powers of the Plan in terms of Paragraph 3 of this Constitution, and all such further powers as are permitted under any law that may be applicable, and all powers contained in any bye-laws, rules or regulations framed by virtue hereof, and without in any way derogating from or limiting its powers, the Board of Directors shall in addition have power:

(*a*) To enter into any contracts that may be necessary or expedient in furthering or carrying out the objects of this Society.

(*b*) To make, alter and repeal regulations, rules or bye-laws to cater for any matter relating to the affairs of the Plan and to determine the manner in which such regulations, rules and bye-laws shall be created or rendered effective. Any action taken under this clause must be by a three-fourths ($\frac{3}{4}$) majority vote of the Board of Directors.

(*c*) To appoint any sub-committee and delegate powers thereto.

(*d*) To control the funds of the Plan and to make provision for the investment of any funds not immediately required.

(*e*) To lay down a schedule of fees and to determine in what proportion the income or funds of the Plan shall be available for payment for services rendered by Participating Members.

(*f*) To open a Banking Account or Accounts, and to delegate to any person or persons the powers and rights to operate thereon.

(*g*) To employ and engage servants and staff upon such terms

as the Directors may deem fit, with power to create and subscribe to any benevolent funds, pension schemes, or any other scheme for the assistance of employees.

(*h*) To adjudicate upon disputes between members and former members, whether of the same class or otherwise, with the right to co-opt to the Committee when so adjudicating any attorney, advocate or accountant, and where it so deems fit to refer any such dispute to arbitration with the right to nominate the Arbitrator and to settle the terms of reference.

(*i*) To investigate and hear any complaint made by or against any Member, with the right to require any Member to furnish such information as may be required.

(*j*) To admit, expel or suspend Members.

(*k*) To require that any person who alleges that he has any claim whatsoever against the Plan which may be the subject of dispute, to refer such dispute to arbitration in accordance with the Laws of Arbitration for the time being in force in the Transvaal.

(*l*) To borrow money upon such terms and conditions as the Board may think fit, with power to furnish security by means of any mortgage bond, pledge, hypothecation of any of the Plan's assets, as may be deemed expedient.

13. (*a*) A Director who is a Participating Member shall be entitled to enter into any contract with the Plan to provide services required by the Plan. Save for the aforegoing, no Member of the Board of Directors shall be entitled to be interested directly or indirectly in any proposed contract with the Plan without having prior to the entering into of such contract declared the nature and extent of his interest therein by written notice. In the event of a Director having such interest and not having disclosed the nature and extent thereof, he shall be liable to expulsion as Director and to termination of his membership.

(*b*) Any casual vacancy occurring among the Directors elected by the Participating Members may be filled by the Directors, but any person so chosen shall retain his office only for the unexpired period of office of the previous Director, whose office has been vacated.

(*c*) In the event of any casual vacancy occurring among the Directors appointed by the Council of the Southern Transvaal Branch of the Medical Association of South Africa, the said Council shall be invited to appoint a Member to fill the vacancy for the unexpired period of office.

(*d*) The Board may meet for the despatch of business, adjourn and otherwise regulate its meetings as it thinks fit.

(*e*) A quorum for meetings of the Board shall be four (4) Directors.

(*f*) Questions arising at any meeting of the Board shall be decided by a majority of the votes unless herein expressly provided, and in case of an equality of votes, the Chairman shall exercise a second or casting vote.

(*g*) The Chairman, or in his absence the Vice-Chairman, may at any time summon a meeting of the Board.

(*h*) The Chairman shall preside at all meetings of the Board, or in his absence, the Vice-Chairman, or in the absence of both Chairman and Vice-Chairman, the Directors shall elect one of their number to preside at the meeting.

(*i*) A resolution signed by not less than ten (10) Directors shall be valid and effective as if it had been passed at a meeting of the Board duly called and constituted.

(*j*) All acts done by any meeting of the Board, or the Executive Committee hereinafter referred to, or by any person acting as a Director, notwithstanding that it is afterwards discovered that there was some defect in the appointment of any such Director or Member of the said Executive Committee, or that they or any of them are disqualified, shall be valid as if such person had been duly appointed and was qualified to be a Director.

(*k*) All documents to be executed on behalf of the Plan shall be executed by a Director or the General Manager, hereinafter referred to, and his capacity shall be stated.

14. *Officers*

(*a*) The officers of the Plan shall be the Chairman, the Vice-Chairman and the General Manager. The General Manager shall be the chief administrative officer of the Plan as a remunerated employee, and he shall carry out all the administrative work required in the affairs of the Plan, and shall further render such services and do such work as may be prescribed by the Board with such powers as he may be allocated. He shall attend and take part in all meetings of the Plan, Board of Directors, and Executive Committee, but he shall have no vote.

(*b*) At the first meeting of the Board of Directors after an Annual General Meeting, the Directors shall elect a Chairman and a Vice-Chairman, who shall hold office for one year. Any casual vacancy in the office of Chairman or Vice-Chairman shall be filled by the Directors from one of their number.

(*c*) The Chairman of the Board of Directors shall preside at all meetings of the Plan. He shall be an ex officio member of all Committees appointed by the Board. He shall perform such other duties as customarily pertain to that office.

(*d*) The Vice-Chairman shall perform the duties and obligations assigned to him by the Board. He shall in the absence of the Chairman assume all responsibilities and functions of the Chairman. In absence or disability of any officer a temporary presiding and/or administrative officer may be appointed by the Board of Directors.

(*e*) Subject to the approval of the Board, the General Manager shall issue or cause to be issued notices of all meetings of the Plan and of the Board of Directors requiring notice hereunder. He shall keep a record of all meetings, and shall perform such other duties as customarily pertain to the office of Secretary. An assistant Secretary or Secretary pro tem. not necessarily a Member or Director may be designated by the Board for such period and purpose as the Board may determine.

(*f*) Subject to the approval of the Board, the General Manager shall have the supervision of the receipts, custody and disbursements of all funds of the Plan, and the purchase and sale of its securities, and shall establish or cause to be established a proper system of bookkeeping and accounting of funds of the Plan, and cause to be deposited in Banks approved by the Board of Directors all monies received. Securities of the Plan shall be placed in the custody of a Bank designated by the Board. He shall also perform such duties as pertain to the office of Treasurer.

15. *Executive Committee*

(*a*) There shall be an Executive Committee composed of the Chairman, Vice-Chairman and three additional members of the Board of Directors. The Executive Committee shall be vested with all the powers of the Plan and of the Board of Directors between meetings of the Plan and of the Board of Directors, and shall report in writing at the next meeting of the Board of Directors all actions taken.

(*b*) The Executive Committee shall meet at the call of the Chairman or, in his absence, the Vice-Chairman, and three (3) voting Members shall constitute a quorum.

(*c*) The Executive Committee shall deal with all matters of discipline for recommendation to the Board of Directors and it shall advise the Board on matters of general policy and shall direct the General Manager in the carrying out of his duties.

16. The Board of Directors by resolution entered upon the minutes may delegate any of its powers to Committees consisting of one or more members of the Plan as it may deem fit, unless otherwise herein provided, and a Committee so formed shall in the exercise of its powers so delegated conform to any regulations that may be imposed upon it by the Board of Directors.

17. *Auditors*

(*a*) The Auditor or Auditors of the Plan shall be a chartered accountant or accountants, and shall in the first instance be appointed by the original Directors to hold office until the first Annual General Meeting, and thereafter shall be appointed annually at the Annual General Meeting.

(*b*) The Board of Directors may appoint an Auditor or Auditors to fill any casual vacancy in the office of Auditor, and any Auditor or Auditors so appointed shall hold office until the next Annual General Meeting, and shall be eligible for re-appointment.

(*c*) Once at least in every year the accounts and books of the Plan shall be examined and their correctness ascertained by the Auditor or Auditors, and such Auditor or Auditors shall make a report at each Annual General Meeting upon the books and accounts and general state of the finances of the Plan.

(*d*) The fiscal year of the Plan shall be the calendar year.

18. *Participating Members.* Participating Members shall be registered medical practitioners in private practice in the area of operation of the Plan, who agree in writing with and in form and substance approved by the Plan to perform the professional services eligible for payment under and in accordance with the terms of Subscription Contracts that may be issued in connection with the Plan at such rates of remuneration as may from time to time be determined by the Board of Directors, and who agree

to abide by the Bye-laws, Rules and Regulations of the Plan applicable to Participating Members. The Board of Directors may terminate the Agreement with any Participating Member in accordance with Paragraph Six (6) hereof.

19. *Alteration of Constitution.* Alteration, addition, or deletion of clauses to the Constitution may be proposed at an Annual or Special General Meeting of the Plan, provided that at least fourteen (14) days' notice has been given to each Participating Member, specifying the exact wording of the proposed alteration, addition or deletion. Adoption of the proposed alteration, addition or deletion shall be by a two-thirds majority of those present and voting, provided a quorum is present at such meeting.

20. *Indemnity.* The Officers and Directors of the Plan and their heirs, executors and administrators shall be indemnified and saved harmless out of the assets of the Plan, from and against all actions, costs, damages, charges, losses and expenses which they or any of their heirs, executors or administrators shall or may incur in or about the execution of their duties or supposed duties in their respective offices or trusts except such as may be incurred or sustained by reason of their own wilful neglect or default.

21. *Actuarial Scrutiny.* At least once in every five (5) years the Board of Directors shall cause a valuation to be made by a valuator of liabilities of the Plan in respect of its operation as a medical-surgical plan, in so far as such liabilities are capable of actuarial valuation.

22. *Dissolution or Winding Up.* In the event of dissolution or winding up of the Plan, its funds and assets shall be used firstly in payment of any costs incurred in such dissolution or winding up; secondly, in payment of the debts and liabilities of the Plan then due and accruing; and the balance, if any, shall be disposed of as may be directed by the Participating Members of the Plan, provided that there shall be no division among the members of any residual assets, failing which application shall be made to the Supreme Court, Witwatersrand Local Division or any Judge thereof to whom application for directions shall be made by the Directors of the Plan or the liquidator thereof as the case may be, subject to the laws of South Africa governing such organizations.

BYE-LAWS

Financial

(*a*) There shall be included in the minutes of the meetings of the Board of Directors a record of the approval of payments made or to be made to Participating Members.

(*b*) No payment in respect of medical services rendered shall be made except in accordance with a Schedule of Fees approved by the Board of Directors, such approval to be recorded in the minutes of the meeting.

(*c*) The rate of payment of professional accounts shall be determined by the Board of Directors after consideration of the nett earned subscription income estimated to become available to the Plan for the payment of medical professional services, after creating legal reserves, reserves for expenses, contingencies, seasonal fluctuations in illness, and the like. The determination by the Board with regard thereto shall be final.

(*d*) Whenever in any given period (the length of which shall from time to time be determined by the Board) the amount of money determined as aforesaid anticipated to become available for payment of then current participating members' bills does not suffice to pay the full amount thereof as established therefor in the current Schedule of Fees applicable thereto, payment by the Plan to Participating Members may be less than the amount specified in the Schedule of Fees but shall be deemed by the Participating Members as payment of the full amount specified in the schedule of Fees as applicable to the services rendered by such Participating Member and the determination of the Board with regard to the lesser amount to be paid the Participating Member shall be final.

(*e*) Payment by the Plan to Participating Members for services rendered to eligible persons whether or not such payment under the particular provision of the Subscription Contract is deemed to be in full payment of the professional services rendered shall be based upon the then current Schedule of Fees applicable thereto. Any lesser amount as shown in the then current Schedule of Fees applicable thereto, payable by the Plan for any given period shall be determined by the Plan with due regard to the relation between (*a*) the total amount of claims estimated to be incurred in such period and (*b*) the nett earned subscription income estimated to become available during such period of payment.

(*f*) Subject to the limitations and exclusions of the Subscriber Contract, the Plan agrees to pay for medical, surgical, obstetrical and related services rendered to a Subscribing Member by a duly registered Medical Practitioner other than a Participating Member not more than three-quarters ($\frac{3}{4}$) of the amount which a Participating Member would be entitled to for such service. This payment will be in the form of a cash refund to the Subscribing Member and not paid directly to the Medical Practitioner concerned.

Postal Voting: Election of Directors

1. If the number of Directors nominated for office exceeds the number of vacancies to be filled, the number of Directors to be appointed shall be decided by ballot.

2. The General Manager shall cause voting papers to be prepared to embody thereon the names of the candidates seeking election, and a voting paper shall be transmitted by ordinary post, together with a stamped addressed envelope, for the re-transmission to the Manager of the completed voting paper.

3. Voting papers shall be transmitted not less than four weeks prior to the Annual General Meeting, and Participating Members shall be required to return voting papers duly completed at such time as shall be fixed by the Manager, but not later than one week prior to the date of the Annual General Meeting.

4. Each Participating Member shall be entitled to vote, and any voter shall be obliged to vote for the number of candidates to be elected, no more and no less.

5. The completed ballot paper must be placed in the envelope specially provided for the purpose, which shall be sealed and duly signed by the voting Participating Member, and shall be posted or delivered to reach the registered office of the Plan not later than the date specified on the ballot paper.

6. A ballot paper containing any other mark or writing of any kind other than a cross in the appropriate space or spaces provided or sent in an envelope other than in the prescribed stamped envelope duly signed by the Participating Member, shall be regarded as a spoiled paper.

7. The checking and opening of envelopes containing ballot papers and the counting of votes shall not be undertaken prior to the closure of the poll and shall be entrusted to scrutineers appointed by the Board of Directors. No candidate for office shall act as a scrutineer.

8. Any voting paper not complying with the aforegoing shall be invalid.

9. In the event of any doubt arising as to the validity or otherwise of any voting paper, the decision of the Board of Directors shall be final and binding.

10. On the day after the last date for receipt of voting papers the General Manager shall deliver all envelopes to scrutineers appointed by the Board, who shall count the votes cast for the various candidates. The result of the poll shall be certified in writing by the scrutineers.

11. In the event of a tie between two or more candidates, such candidates shall be notified thereof, and should there be no withdrawal by any of such candidates of his decision to seek election, and should such candidates not agree between themselves as to who shall be appointed, they shall draw lots.

12. The result of the poll shall be announced by the Chairman at the Annual General Meeting.

TERMS AND CONDITIONS OF ENROLMENT

I. Definitions:

1. *Agreement.* The term 'Agreement' shall mean the Subscriber's Application, his Identification Card, these Terms and Conditions and the Rules referred to therein.

2. *Plan.* The term 'Plan' shall mean the Medical Services Plan.

3. *Subscriber.* The term 'Subscriber' shall mean any person described as such on the face of the Subscriber's Application and with whom this Plan enters into a subscription agreement.

4. *Dependant.* The term 'Dependant' shall mean the Subscriber's spouse or such of his unmarried children under the age of eighteen years, or such unmarried children residing with him toward whom he stands in the position of a parent, as are under the age of eighteen years and are named in his application or are sub-

sequently enrolled as Dependants in accordance with the provisions herein contained. In no event shall any child be entitled to any benefits or services hereunder after the child shall marry, attain the age of eighteen years or become a full-time wage earner.

5. *Medical Practitioner.* The term 'Medical Practitioner' shall mean a medical practitioner who is registered as such under the Medical, Dental and Pharmacy Act (No. 13 of 1928) of South Africa or such similar statute as governs the practice of medicine in the area in which any surgical, obstetrical or medical services are rendered to a Subscriber or Dependant.

6. *Participating Doctor.* The term 'Participating Doctor' shall mean a general or specialist medical practitioner between whom and the Plan an agreement for the provision of surgical, obstetrical or medical services in their respective capacities to Subscribers or Dependants is in full force and unrevoked.

(*a*) A *Participating General Practitioner* shall mean a Participating Doctor with whom the Plan has an agreement for providing surgical, obstetrical and medical services to its Subscribers and Dependants as a general practitioner.

(*b*) A *Participating Specialist Practitioner* shall mean a Participating Doctor who practises as a Specialist, and with whom the Plan has an agreement for providing surgical, obstetrical or medical services to its Subscribers and Dependants as a Specialist.

7. *Non-Participating Doctor.* The term 'Non-Participating Doctor' shall mean a registered medical practitioner with whom the Plan has no agreement for providing surgical, obstetrical or medical services to its Subscribers or Dependants.

8. *Obstetrical Services.* The term 'Obstetrical Services' shall mean services for a condition due to or connected with pregnancy other than the case of a normal birth (with or without instrumental assistance), and shall include a caesarian section and an ectopic pregnancy.

9. *Subscription Rate.* The term 'Subscription Rate' shall mean the amount periodically charged by the Plan for this comprehensive medical-surgical-obstetrical services agreement.

10. *Contract Year.* The term 'Contract Year' shall mean the period of twelve (12) months from the effective date of this agreement, and each yearly period thereafter while the agreement is in effect.

11. *Effective Date.* The term 'Effective Date' shall mean 12.01 a.m. South African time at the address of the Subscriber, on the date this agreement is issued as it appears on the face of this agreement and the Subscriber's Identification Card.

II. Plan Agent for Subscriber. The Plan has obtained Agreements from Participating Doctors for the rendering of surgical, obstetrical and medical services as herein set forth, but it does not agree to provide any specific doctor; the securing of the doctor is the responsibility of the Subscriber. The Plan shall not under any circumstances be liable for any negligence, misfeasance, malfeasance, nonfeasance, malpractice, or any act or omission on the part of any Participating Doctor, or non-Participating Doctor, or hospital or of any agent or employee of any such Doctor or hospital.

III. *Available Services*

The Subscriber or Dependant shall be entitled to obtain surgical, obstetrical and medical care such as the following:

(*a*) Home, office and hospital calls;

(*b*) Medical and surgical services;

(*c*) *Confinements:*

In lieu of the provision of medical benefits for confinement, pre-natal or post-natal care, a Maternity Grant of £25 will be made to the Subscriber, plus an amount up to £2 5s. 0d. per day for each day necessarily spent in hospital or nursing home for a maximum period of 10 days, commencing from the day of the confinement. A multiple birth shall not affect the amount of the Grant.

(*d*) Administration of anaesthetics;

(*e*) Hospital services, as hereinafter defined;

(*f*) Treatment of fractures and dislocations;

(*g*) In the case of a prolonged or incurable illness of an actual or anticipated duration of six months or more, the continuation of treatment and the extent, if any, of future benefits, shall be at the discretion of the Plan.

Note. It is the intention of the Plan to provide comprehensive medical, surgical and obstetrical services to its Subscribers. For this purpose it is essential to obtain the full co-operation and the utmost good faith of Subscribers in avoiding all unnecessary use of benefits. In the event of a Subscriber changing his doctor, it is incumbent upon him to disclose all treatment and benefits he has received through the Plan. To protect the Plan and the other Subscribing Members, if a Subscriber uses the benefits unnecessarily or fails to disclose the treatment and benefits received, or if the Plan is satisfied that a Subscriber has abused or is abusing the benefits granted under this Contract in any way, the Plan has the right to cancel such Subscriber's membership immediately, and to terminate this Contract.

IV. *Waiting Periods*

Upon acceptance by the Plan and the payment of the Subscription Rate, the Subscriber or Dependants shall be entitled to the immediate surgical, obstetrical or medical services, offered by the Plan. However, there shall be a waiting period, as set out below, for the following services:

(*a*) Obstetrical Services—and Maternity Grant—except ectopic pregnancy—shall not be available until both husband and wife shall have been enrolled for at least 10 consecutive months prior thereto on the same agreement.

(*b*) Tonsillectomy and Adenoidectomy—after six (6) consecutive months of enrolment.

(*c*) Herniotomy—after six (6) consecutive months of enrolment.

(*d*) Reparative Gynaecological Surgery—after six (6) consecutive months of enrolment.

(*e*) Refractions—after nine (9) consecutive months of enrolment and thereafter not more than once every two (2) years.

(*f*) Deafness existing before enrolment—after eighteen (18) consecutive months of enrolment.

V. *Exceptions*

Available services to the Subscriber or his Dependants as set forth above shall not include:

(*a*) Services for injury, illness or conditions which entitle the Subscriber or his Dependants to compensation or treatment under the Workmen's Compensation Act, Motor Vehicle Act, or under any legislation relating to compensation for injuries or disease arising in the course of employment, or applicable to persons who served in the Armed Forces, or to classes of persons given similar protection (Government employees, Prisons, Police and Pensions).

(*b*) Medical or surgical services when the Subscriber or his Dependants is a patient under the care of a sanatorium or hospital for tuberculosis, mental illness or disease, alcoholism, or epilepsy, or as a drug addict, or when the Subscriber or his Dependants in question should properly be such a patient.

(*c*) Service for any physical condition, ailment or disease, except as otherwise provided in these Terms and Conditions, which known or unknown to the Subscriber or his Dependants may be considered from a medical standpoint to have been in existence in any form on the effective date of the agreement, unless the Subscriber or his Dependants has been covered under the agreement for at least nine (9) consecutive months at the time services of a registered medical practitioner are initiated for the particular condition, ailment or disease.

(*d*) Operations or treatment for cosmetic purposes. Special cases may be submitted to the Plan for decision.

(*e*) Operations or treatment for conditions which are not detrimental to bodily health.

(*f*) Examinations for insurance, school, camp, association, visa, employment, or similar purposes.

(*g*) Congenital abnormalities, other than in Dependants born after the Subscriber's enrolment.

Note. Where the Subscriber or his Dependant is entitled to compensation from other sources in respect of medical, surgical, obstetrical and hospital services, the benefits will be reduced by the amount of such compensation from these other sources which the member or his dependant has received or which they are entitled to receive.

VI. *Subscription Rates*

The Subscriber agrees to pay the Plan in advance each month the Subscription Rates as stated in his application form. The Plan reserves the right to change the rates as of the commencement of any agreement month on thirty days written notice to the Subscriber.

The surviving Spouse and the Dependants of a deceased Subscriber, or a Spouse and Dependant of a deserting or divorced

Subscriber, have the right to continue to be entitled to the benefits of this agreement by paying the Subscription Rate directly to the Plan.

VII. *Choice of Medical Practitioner*

1. The Subscriber or Dependant, unless otherwise provided, may choose any registered medical practitioner he may desire who will agree to accept him or his Dependant as a patient, but shall be required to notify the Plan of any change of medical practitioner.

2. Where the Subscriber or Dependant chooses a Participating Doctor for surgical, obstetrical or medical services, the Plan shall pay to the Participating Doctor directly, the fee for such services, based upon the Schedule of Fees of the Plan, then in full force and effect, and this shall be payment in full for the services rendered. A list of Participating Doctors shall be available to the Subscriber or Dependant in the office of the Plan for inspection.

3. Where the Subscriber or Dependant chooses a non-Participating Doctor for surgical, obstetrical or medical services, the Plan shall pay to the Subscriber or Dependant for services rendered by such non-Participating Doctor an amount not exceeding seventy-five percent (75%) of what would have been paid to a Participating Doctor for such services.

Note. A non-Participating Doctor not having been enrolled with the Plan is not subject to its authority or to any limitations that may be imposed by the Plan on his charges for service.

4. Except in exceptional circumstances, the services of a Participating Specialist Practitioner for consultations and/or treatment shall be provided only on the authorization of the attending Participating General Practitioner. In the event of a Subscriber or Dependant failing to obtain such prior authorization, he shall be required to justify his actions to the Board of Directors of the Plan before liability for the Specialist's services so rendered attaches to the Plan.

5. Subject to the provision of Sub-Clause 4 above, the Subscriber or Dependant has the right to nominate the Participating Specialist Practitioner of his choice, and the attending Participating General Practitioner may not refuse to consult with a Specialist so named, if the services falls within his speciality.

6. If requested by the Plan, the Subscriber or Dependant will obtain from any Medical Practitioner rendering services to him a detailed statement in writing, sufficient to enable the Plan to understand the nature and extent of such services.

VIII. *Identification.* Each Subscriber shall be given an Identification Card. This card must be presented to the Medical Practitioner when service is requested for himself or dependants.

IX. *Enrolment of New-Born Children and Other Dependants after Effective Date of Agreement*

1. A new-born child may be enrolled as a Dependant by notice in writing to the Plan within 30 days after its birth, provided its mother is covered under an agreement with the Plan.

2. A newly acquired spouse may be enrolled as a Dependant by notice in writing to the Plan within 30 days after the marriage.

3. Except as aforesaid, a Dependant not named in the Subscriber's application may only be enrolled on his Group-opening date, which, after the initial enrolment date, will be periodically arranged by the Plan, and then only if the Subscriber offers to add all his Dependants not previously covered and provided the Plan is furnished with such information regarding them as it may require and agrees to such addition.

4. On the addition of a Dependant, the Subscriber shall pay any additional subscription rate that may be applicable. A new-born child shall be entitled to the benefits of this agreement from its birth, notwithstanding that the additional subscription, if any, shall be due and payable as from the subscription date immediately following such birth. A newly acquired spouse, added as a Dependant within 30 days of the marriage, shall be entitled to the benefits of this agreement as from the subscription date immediately following the marriage, and all other added Dependants from the date their enrolment becomes effective.

X. *Term and Termination*

1. This agreement shall be in effect for one month from the date on the Subscriber's Identification Card and from month to month thereafter until terminated as hereinafter provided.

2. Either party may terminate this agreement as at the end of any Agreement Month by giving the other thirty (30) days prior notice in writing to that effect. Provided that in the case of the Plan, the Subscriber or his Dependant must have acted in a manner detrimental to the objects, Constitution, Bye-Laws, Rules or Regulations of the Plan in the opinion of the Board of Directors.

3. Failure to pay the rate provided shall automatically result in termination of this contract, and all benefits thereunder.

4. If the rate payable by the Subscriber has been determined because he is a member of a Group, he shall, if he ceases to be a member of the Group, retain the benefit of the Agreement only until the end of the Agreement Month for which payment has been made at the date he ceases to be a member of the Group.

5. If a Subscriber leaves the Group he may apply to the Plan for enrolment as an individual Subscriber, provided he does so within 30 days of his leaving.

6. Any child of the Subscriber, or other child included under this agreement as a Dependant, on attaining the age of eighteen years, or marrying or becoming a full-time wage earner, shall thereupon cease to be included in the term "Dependant" and shall not thereafter be entitled to any benefits under the Agreement. If the Subscriber makes application in writing to the Plan within 30 days after such child ceases to be covered by this Agreement, the Plan may, in its discretion, enter into an Agreement for the provision of services to such former Dependant.

7. When the Agreement ceases to cover any Dependant previously included, the Subscription Rate shall be appropriately adjusted.

8. The Plan may at its option upon the application of any Subscriber reinstate his agreement after termination under the terms hereof upon such conditions and at such rates as the Plan may decide. The acceptance by the Plan of any payment for Subscription Rates after termination of this agreement shall not revive it until the Plan has agreed in writing so to do. The payment so accepted shall be held for the credit of the Subscriber until this agreement has been revived, and if it is not revived, it shall be repaid to him.

XI. *Agreement not Assignable.* The services provided for as aforesaid are for the personal benefit of the Subscriber and his Dependants if any, and may not be transferred or assigned.

XII. *Surrogation.* Where a Subscriber or Dependant is provided pursuant hereto with surgical, obstetrical, or medical services as herein defined by reason of an illness or accident in respect of which some third party is under legal liability, the Plan shall be surrogated to the Subscriber's or Dependant's rights to compensation for the cost of the surgical, obstetrical, or medical services rendered in respect of such illness or injury to the extent of the amount paid by the Plan in respect thereof. The Subscriber undertakes and agrees that he or the Dependant so entitled to compensation shall prosecute such claim and pay over to the Plan what it is entitled to receive as aforesaid from any monies recovered from such third party and he, or the Dependant, will do all acts and execute all documents necessary to permit the Plan to obtain the benefit of this clause.

XIII. *Hospital Service.* The Plan shall provide to the Subscriber or his Dependant, accommodation in hospitals and nursing homes approved by the Plan, in a General Ward of four or more beds, meals, dietary services, general (not special) nursing care, use of surgery and delivery rooms, surgical supplies, splints, casts, dressings, and such drugs and medications as are ordinarily supplied without charge by hospitals. If a Subscriber is accommodated in a hospital or nursing home not approved by the Plan, the Plan's liability for the hospital services shall not exceed the amount that the Plan would have paid to any approved hospital or nursing home.

XIV. *Disputes.* In the event of any dispute as to whether surgical, obstetrical or medical services required by or rendered to a Subscriber or Dependant are within the scope of this Agreement, such dispute shall be submitted to and determined by the Board of Directors of the Plan, and its decision shall be final and binding upon the Subscriber and his Dependants and the Participating Doctor.

XV. *Power to Appoint Consultant.* The Subscriber agrees, and undertakes to obtain from a Dependant, an agreement that the Plan may, at its own expense, appoint a Participating Doctor to consult with any medical practitioner rendering services to the Subscriber or his Dependant hereunder. The rendering of any services under this agreement to the Subscriber or a Dependant is conditional upon his permitting such consultation and any

examination that may be reasonably required in connection therewith.

XVI. *Authority for Use of Case Records.* The Subscriber consents and he will if required procure from a Dependant a consent to the Plan's obtaining from any medical practitioner, hospital or nurse taking part in the rendering of any service hereunder, to use for statistical, actuarial, scientific or any other reasonable purpose, the diagnosis and history of the illness or injury in question and particulars of any treatment rendered in respect of it.

XVII. *Rules.* The Subscriber agrees that the Plan may from time to time adopt such Rules and Regulations as are reasonably necessary to facilitate the provision of the surgical, obstetrical and medical services above mentioned and he agrees that the rendering of such services shall be subject to the condition that he and his Dependants will comply with such Rules and Regulations.

XVIII. *No Authority to Change Agreement.* The Subscriber's Application for Enrolment, his Identification Card and these Terms and Conditions of Enrolment constitute the entire Agreement between the Subscriber and the Plan, and no agent, employee, or other person is authorized to vary, add to or change the Agreement in any particular.

XIX. *Change of Address.* The Subscriber will furnish the Plan promptly with notice in writing of any change in the address of himself or his Dependants.

XX. *Notices*

1. Any notice to the Subscriber or a Dependant may be given by mailing the notice to the address of the Subscriber or Dependant, as set out in the Application, unless notice has been given to the Plan in writing by registered post of a change thereof, in which event the notice shall be sent to the new address as given.

2. Where the Subscriber is a member of a group, the Subscription Rates for which are paid by or through some individual or corporation, notice to such individual or corporation shall constitute notice to the Subscriber and his Dependants.

3. Notices when given as above provided shall be deemed to have been received by the Subscriber and his Dependants at twelve o'clock midnight of the day following the day of the actual mailing thereof.

4. Any notice to the Plan may be given by registered post addressed to the Head Office of the Plan.

XXI. *Interpretation.* In the event of the Subscriber or a Dependant being a female, this Agreement shall be read with all appropriate grammatical changes.

XXII. *Date of Agreement.* The effective date of the Agreement shall be the date of the Subscriber's Identification Card.

XXIII. Failure to comply with any of these Terms and Conditions shall, at the discretion of the Board of Directors, render this Agreement null and void.

PARTICIPATING DOCTOR'S CONTRACT

MEDICAL SERVICES PLAN AGREEMENT

The undersigned Medical Practitioner agrees as a Participating Doctor with the Medical Services Plan, herein referred to as 'the Plan', to provide to Subscribers and their Dependants of the Plan services as

☐ GENERAL PRACTITIONER

☐ SPECIALIST.....

(state certified speciality)

subject to the terms and conditions herein set forth.

Agreement No. ..... *Effective Date*.....

Medical Services Plan

.....

Chairman

.....

General Manager

.....

Participating Doctor

Address: .....

.....

(St. No. 1.)

TERMS AND CONDITIONS OF PARTICIPATING DOCTOR'S AGREEMENT

I. *Definitions*

1. '*Subscriber*' shall mean any person who is entitled to receive medical, surgical, or obstetrical services under an agreement with the Plan.

2. '*Medical Practitioner*' shall mean a person who is registered as a medical practitioner in terms of the Medical, Dental and Pharmacy Act (No. 13 of 1928) of South Africa.

3. '*Participating Doctor*' shall mean any registered medical practitioner with whom the Plan has an agreement for providing medical, surgical or obsterical services to Subscribers.

4. '*General Practitioner*' shall mean a Participating Doctor with whom the Plan has an agreement for providing medical, surgical or obstetrical services to Subscribers as a General Practitioner.

5. '*Specialist*' shall mean a Participating Doctor who has been registered as a Specialist in terms of the Medical, Dental and Pharmacy Act (No. 13 of 1928) of South Africa, or who confines his practice to a particular branch of medicine, and is recognized by the Plan as a Specialist, for the purpose of this Agreement.

II. *Term.* This agreement shall be for the term of one year from the effective date hereof. Thereafter, it shall continue from year to year until terminated as at the end of any contract year on one month's notice in writing, or in terms of the Constitution of the Plan.

III. *All Registered Medical Practitioners may become Participating Doctors.* Any medical practitioner may become a Participating Doctor upon entering into an agreement with the Plan.

IV. *Remuneration to Participating Doctors*

1. *Schedule of Fees*

(*a*) The Schedule of Fees for Participating Doctors for services rendered by them to Subscribers shall be in accordance with the Schedule of Fees prescribed by the Plan.

(*b*) For any procedures not covered in the aforesaid Schedule of Fees, the fees shall be fixed by the Plan.

(*c*) In as much as the Plan will fix the fee in the case of any complicated or prolonged illness, a Participating Doctor shall be obliged to notify the Plan in writing in any case where the condition of a patient has become complicated.

2. *Method of Reviewing and Approving Accounts*

(*a*) The Participating Doctor will submit his accounts for services rendered to Subscribers, with reports on the conditions for which services were rendered, in the manner required on the forms provided by the Plan for review and approval by the Board of Directors.

3. *Payment of Fees*

(*a*) The Plan may set up from its collections from Subscribers such reserves from time to time as it considers desirable.

(*b*) Except as hereinafter provided out of the total payments made by Subscribers, the Plan shall set aside such amounts as it considers necessary to pay for current administration expenses and to provide the aforesaid reserves. The balance remaining shall be set aside and made available for the payment of accounts as approved for services rendered.

(*c*) If during any period, the amount of subscription income received is not sufficient to cover the amount of approved accounts for services rendered for this period, the Board of Directors of the Plan may apportion all approved accounts for this period. Any unpaid balance shall be paid out of any surpluses which may be released for that purpose by the Plan, and each Participating Doctor shall be entitled to share in surpluses so released in the proportion that the unpaid balance due him on his approved accounts bears to the total unpaid balance due on all approved accounts.

(*d*) Unpaid balances of approved accounts shall constitute a charge against any surplus funds available for payment to Participating Doctors at the termination of the fiscal year during which the services covered by such Doctors were rendered.

(*e*) The Board of Directors of the Plan may, by a resolution approved by two-thirds (2/3) of the members of the Board, write off such unpaid balances as have been outstanding for more than twelve months and the Plan thereafter ceases to be liable in respect thereof.

(*f*) A Participating Doctor rendering services to a Subscriber which such Subscriber is entitled to receive under an agreement with the Plan, shall not be entitled to make any charge to such Subscriber in respect thereof, and such Participating Doctor shall accept payment from this Plan in the manner herein provided as full and final payment for such services rendered.

(*g*) In case of the termination of the Contract, outstanding claims and accounts shall be paid within six (6) months of termination.

4. *Time for Rendering of Participating Doctors' Accounts.* To enable accounts to be paid promptly, Participating Doctors shall submit reports and accounts required in terms of Clause IV (2*a*) before the 28th day of the month following within which the services were rendered or on completion of treatment.

5. *Accounts Received Late.* Where accounts and reports are not rendered within the period referred to in the preceding sub-clause, the Plan will be entitled to withold payment on such late accounts at the discretion of the Board of Directors for any period up to six months.

6. *Deduction for Administrative Fee.* The Board of Directors of the Plan shall at its discretion deduct ten percent (10%) or such lesser amounts as may be necessary of all approved accounts to provide for the costs of administering the Plan.

V. *Relation of Participating Doctors and Subscribers*

1. A Subscriber shall have the right to engage and terminate the services of a General Practitioner who shall retain the right to accept or decline a patient in accordance with the custom and practice of the Medical Profession. Nothing contained in this agreement or in the objects of the Plan in the provision of medical services and the payment of medical fees shall in any manner affect the legal or ethical relationship between Doctor and Patient.

2. Except in exceptional circumstances, the services of a Participating Specialist for consultation, treatment or surgery shall be provided only on the authorization of the attending General Practitioner, which authorization shall not be unreasonably withheld. In the absence of such prior authorization, the Subscriber shall satisfy the Board of Directors of the Plan of the necessity therefor, before liability for the Specialist's services so rendered attaches to the Plan.

3. Subject to the provision of Sub-Clause 2 above, the Subscriber has the right to nominate the Participating Specialist of his choice, and the attending Participating General Practitioner shall not refuse to consult with a Specialist so named, if the service falls within his speciality.

4. The Plan may of its own initiative appoint a Participating Doctor to consult with any Participating Doctor rendering services to a Subscriber, and the attending Participating Doctor shall be obliged to permit such consultation and any examination that may be reasonably required in connection therewith, but the Plan will pay the fees of such consultant.

VI. *Benefits to Subscribers*

1. *Identification of Subscriber.* In seeking services from Participating Doctors, Subscribers are obliged to produce an Identification Card which indicates the type of agreement made between a Subscriber and the Plan.

2. Copies of the Subscriber's Agreement shall be furnished on request to Participating Doctors.

3. Having regard to the objects of the Plan to make available for Subscribers all necessary medical, surgical and obstetrical treatment, attending Doctors will be required to assist the Plan in anticipating the cost of claims, for the creation of reserves and in preventing abuse. Accordingly, in each case where the cost of treatment and investigation will or might exceed £20 0s. 0d. in all, the attending Doctor shall, before rendering services, obtain the approval of the Plan for which purpose he shall give the nature of the illness, the treatment and investigation required and the estimated total cost. In the case of an emergency, however, involving urgent treatment and investigation at a cost which will exceed £20 0s. 0d. such prior approval need not be obtained, but the Doctor concerned shall inform the Plan at the earliest possible moment.

VII. *Termination of Subscribers' Agreements*

No subscriber is entitled to services if his Agreement with the Plan has lapsed or been terminated in accordance with the provisions to that effect set out in it. Default in payment of the monthly subscription rate automatically terminates the Subscriber's agreement.

VIII. *Assignment*

1. This agreement and the benefits thereunder are personal to the Participating Doctor, and are not assignable by him, except that, in the case of a Participating Doctor employed by a Corporate Body, recognized as such by the Plan, payment may be made directly to the Corporate Body.

2. In the case of a *locum tenens* to a Participating Doctor whose appointment as such has previously been notified to the Plan by the Participating Doctor, payment for services rendered by the *locum tenens* shall be made directly to the Participating Doctor.

IX. *Complaints and Controversies re Payment of Accounts or Services Rendered*

1. The Executive Committee of the Board of Directors shall be a Board of Review, and its decision, on the reasonableness of the fees charged, and as to whether services come within those provided under the Subscriber's agreement, shall be final and binding.

2. The decision of the Board of Directors, as to the extent of the Plan's liability in respect of the services rendered by the Participating Doctor, shall be final and binding.

X. *Miscellaneous*

1. The Board of Directors may adopt such rules as it may deem necessary, expedient or proper to facilitate the carrying out of this agreement.

2. The decision of the Board of Directors as to the correct interpretation of these Terms and Conditions shall be final and binding upon Participating Doctors.

3. Notice may be given to the Plan by sending the same by prepaid registered post to its Head Office address; and to the Participating Doctor by prepaid registered post to the address given on his agreement, unless he has given the Plan notice in writing of a new address, in which event it shall be sent to such new address.

XI. The terms of the Constitution of the Plan, any decision made by the Board of Directors thereunder, any Bye-Laws, Rules and Regulations framed by the Board of Directors, and any Rules or decisions made by the Board of Directors in terms of this Agreement, shall be binding on the Participating Doctor.

PHARMACEUTICAL NEWS : FARMASEUTIESE NUUS

WESTDENE PRODUCTS SCHOLARSHIPS

The awards of Westdene Products Scholarship have now been made to 4th, 5th, and 6th year medical students at the 5 South African Universities with faculties of medicine. At Stellenbosch University only one 4th-year award has been made this year, because no provision is yet made for 5th- and 6th-year medical students; 5th-year students will be accommodated at this University in 1960 and 6th year in 1961. Each Westdene Products Scholarship is worth £100, but at Natal University one Scholarship has been divided between two students in their 6th year, each receiving £50.

The awards are made to medical students of high academic standards and showing a sense of social responsibility by taking an active part in student and other affairs.

In addition to these medical scholarships, the Westdene Products Nursing Scholarship for Industrial and Scientific Investigation, valued at £200, has this year again been awarded to Sister B. L. Alford, of Cape Town, who is taking the diploma course in Journalism at the School of Modern Languages, London. On her return to South Africa she will become the first Nurse Editor of the *South African Nursing Journal*.

Mr. C. H. Price, Head of the Pharmacy Department of Rhodes University, has been allocated a further grant of £50 in addition to his Westdene Products Scholarship for Pharmaceutical Study (valued at £200) to enable him to complete his research into the

History of Pharmacy in South Africa, with special emphasis on Pharmaceutical Legislation.

The awards to medical students are as follows:

Cape Town University
4th year — I. C. L. Murray.
5th year — W. Gevers.
6th year — L. C. Handler.

Natal University
4th year — J. R. Domingo.
5th year — D. B. D. Matlhoko.
6th year — S. P. N. Shongwe.
C. T. Maitin.

Pretoria University
4th year — P. J. Schutte.
5th year — J. Du Buisson.
6th year — J. W. Groenewald.

Witwatersrand University
4th year — Miss J. Issroff.
5th year — A. H. Rubenstein.
6th year — R. B. K. Tucker.

Stellenbosch University
4th year — Miss W. G. Dorst.

PASSING EVENTS : IN DIE VERBYGAAN

Dr. H. Shrand, M.B., Ch.B., M.R.C.P.E., D.C.H., of Cape Town, left yesterday on a visit overseas for postgraduate study. During Dr. Shrand's absence his practice will be taken over by Dr. Norman Levy.

* * *

Dr. T. G. Armstrong, M.D., M.R.C.P., left Durban on 31 March for 6 months' postgraduate study at the Cardiac Clinic, Groote Schuur Hospital, Cape Town, and the National Heart Hospital, London. Dr. Armstrong will return to Durban after the completion of this study period.

* * *

South African Cardiac Society (*Cape Province Section*). A combined business and scientific meeting will be held in the E-floor lecture theatre, Groote Schuur Hospital, Observatory, Cape, on 23 April at 8.15 p.m. Membership of this Society is open to all doctors interested in this field of medicine.

* * *

Research Forum, University of Cape Town. A meeting of Research Forum will be held on Tuesday 21 April at 12 noon in the large A-floor lecture theatre, Groote Schuur Hospital, Observatory, Cape. Prof. J. G. Thomson will speak on 'Cirrhosis of the liver in the 3 ethnic groups in Cape Town'. All interested are invited to attend.

* * *

Medical Services Plan. The inaugural meeting of the Medical Services Plan will be held at Medical House, 5 Esselen Street, Hospital Hill, Johannesburg, on Monday 27 April at 7 p.m. The purpose of this meeting is to approve the Constitution, Subscriber's Contract, Participating Doctor's Contract and matters incidental thereto (see pp. 337-344 of this issue of the *Journal*).

* * *

Mr. Neville Fischer, B.Sc., M.B., Ch.B., F.R.C.S. (Edin.), has entered specialist urological practice at 505 Southern Life Buildings, Main Street, Port Elizabeth.

Dr. Neville Fischer, B.Sc., M.B., Ch.B., F.R.C.S. (Edin.), praktiseer nou as spesialis-uroloog te Southern Life-Gebou 505, Hoofstraat, Port Elizabeth.

* * *

Prof. James Black, Chairman of the South African Regional Council of the Royal College of Obstetricians and Gynaecologists, presented the William Meredith Fletcher Shaw Memorial Lecture to the Royal College in London in July 1958. His lecture, 'Reminiscences of 50 years' medical practice, 47 of them spent in South Africa', was published in the *Journal of Obstetrics and Gynaecology of the British Empire*, December 1958 (**65,** 933).

* * *

Mr. H. Gaylis, Ch.M., F.R.C.S. (Eng.), has commenced practice as a specialist surgeon at 202 Osler Chambers, Jeppe Street, Johannesburg. Telephones: Rooms 23-0646, residence 43-6882, emergency 22-4191.

Dr. H. Gaylis praktiseer nou as 'n spesialis-chirurg te Osler-Gebou 202, Jeppestraat, Johannesburg. Telefone: Spreekkamer 23-0646, woning 43-6882, noodoproepe 22-4191.

* * *

Dr. Cecil Moss, M.B., Ch.B. (Cape Town), F.F.A.R.C.S. (Eng.), D.A. (Ire.), D.A. (Eng.), has commenced practice as a specialist anaesthetist at 513 Medical Centre, Heerengracht, Cape Town. Telephones: Rooms 3-1331, residence 7-8926; if no reply 69-2924.

Dr. Cecil Moss, M.B., Ch.B. (Kaapstad), F.F.A.R.C.S. (Eng.), D.A. (Ire.), D.A. (Eng.), het begin praktiseer as 'n spesialis-narkotiseur te Mediese Sentrum 513, Heerengracht, Kaapstad. Telefone: Spreekkamer 3-1331, woning 7-9826; indien geen antwoord 69-2924.

The Ninth International Congress of Paediatrics, which will be held in Montreal, Canada, on 19-25 July 1959, and of which particulars were published in this *Journal* of 28 February 1959 (**33,** 187) and 5 April 1958 (**32,** 390), will be followed by the *First International Conference on Mental Retardation*, to be held in Portland, Maine, USA, on 27-31 July 1959 under the auspices of the Maine Chapter of the American Academy of Pediatrics. Further information may be obtained from Dr. E. Fasser, Hon. Secretary/Treasurer, South African Paediatric Association, 201 Medical Centre, 319 Pretorius Street, Pretoria.

* * *

The American College of Chest Physicians (*First South African Chapter*). The Annual General Meeting of this Chapter will be held on Monday 20 April at 8.15 p.m. at the home of Dr. Harold Hofmeyr, 21 Fairways, Mouille Point, Cape Town. A special programme has been arranged. Dr. W. Silber will speak on 'Benign conditions of the oesophagus' and Dr. G. Efron will speak on 'Malignant conditions of the oesophagus' . The meeting is not confined to members of the American College of Chest Physicians, and all who wish to attend will be welcome, but are asked to inform Dr. Harold Hofmeyr.

* * *

South African Institute for Medical Research, Johannesburg. Staff Scientific Meetings. Sir Macfarlane Burnet, F.R.S., Director of the Walter and Eliza Hall Research Institute, Melbourne, Australia, will give 3 lectures as follows:

27 April on 'Arthropod-borne virus infections' at 5.00 p.m. in the Lecture Theatre of the Poliomyelitis Research Foundation, Rietfontein, Johannesburg.

28 April on 'Auto-immune disease' at 8.15 p.m. at Medical House, Esselen Street, Johannesburg (under the auspices of the Medical Association of South Africa).

29 April on 'The production of antibodies' at 5.10 p.m. in the Harveian Lecture Theatre, Medical School, Hospital Street, Johannesburg.

* * *

The Nutrition Society (Great Britain). A symposium on 'Nutrition and reproduction' will be held on Saturday 4 July 1959 at the School of Veterinary Medicine, Madingley Road, Cambridge. The chairman of the morning session will be Dr. J. Hammond, C.B.E., F.R.S. (of the School of Agriculture, University of Cambridge) and of the afternoon session Dr. T. Mann, F.R.S. (of the A.R.C. Unit of Reproductive Physiology and Biochemistry, School of Veterinary Medicine, University of Cambridge). Papers will be presented on the following subjects: Maternal nutrition in relation to abnormal foetal development; Body stores in pregnancy and lactation; Influence of nutrition on female fertility in large domestic animals; Effect of nutrition on androgenic activity and spermatogenesis in mammals; Nutrition and reproduction in insects; Nutritional state and reproductive capacity in fish; Nutrition and reproduction in the domestic fowl; Influence of nutrition on reproduction in laboratory rodents. The Hon. Overseas Correspondent of the Nutrition Society is Dr. B. Bronte-Stewart, Department of Medicine, Medical School, Observatory, Cape.

* * *

An exhibition of paintings and sculpture by doctors organized by the Cape Town Medical Art Society was held in the Small Gallery of the S.A. Association of Arts, Argus Building, Burg Street, Cape Town, from 31 March to 11 April. The exhibition was opened by Prof. B. Bromilow-Downing. Paintings were exhibited by B. Bromilow-Downing, H. W. Clegg, C. W. Coplans, M. R. Drennan, M. Fredman, I. M. Gans, J. Moir Gordon, W. Lennox

Gordon, Gaisford G. Harrison, R. F. Keet, D. Loon, J. M. McGregor, J. J. Theunissen, H. T. van Diggelen and A. M. Whitaker. Pieces of sculpture were exhibited by Maurice S. Berman, C. W. Coplans and J. Gottlieb. Pottery was exhibited by Wallace J. Wolfsohn, a pencil drawing by Maurice V. Silbert, an etching by Dr. W. Lennox Gordon and a mosaic by Dr. J. Moir Gordon. Paintings by the late Dr. Lindsay Sandes were also shown and sculpture by the late Dr. Joseph M. Coplans. The work in general was of good standard—representational and perhaps rather inhibited. Dr. C. W. Coplans, Hon. Secretary, is anxious for other members of the Cape Western Branch (M.A.S.A.) to join the Society.

NEW PREPARATIONS AND APPLIANCES : NUWE PREPARATE EN TOESTELLE

HYDOL

Boots Pure Drug Company Ltd. announce the introduction of Hydol, a new oral diuretic, and supply the following information:

Hydol is at least 10 times as potent as chlorothiazide. It is supplied in the form of tablets containing 50 mg. of hydroflumethiazide. Hydol offers a new standard of efficiency, economy and safety in diuretic therapy; it is fully effective for the oral route and is active in low dosage. In addition, the cost of treatment with Hydol is lower than with any other potent oral diuretic. Hydol is suitable for both initial and maintenance treatment and effectively replaces the parenteral administration of mercurial diuretics. It is indicated in all cases of cardiac and renal oedema (irrespective of their severity) and in all other cases of fluid retention.

Hydol is supplied in bottles of 100 and 500 tablets.

MADRIBON

Roche Products (Pty.) Ltd., introduce Madribon, a highly active well-tolerated sulphonamide, and supply the following information:

Composition: The active substance of Madribon is 2, 4-dimethoxy-6 sulphanilamido-1, 3-diazine. It is available as tablets of 0·5 g. and drops (in form of suspension) containing 200 mg. per c.c. (1 c.c. being about 20 drops, 1 drop contains approx. 10 mg.).

Properties: Madribon is an extremely well tolerated chemotherapeutic with broad antibacterial spectrum and prolonged action. It inhibits the growth of gram-positive and gram-negative organisms, its action being particularly marked on pneumococci, staphylococci and streptococci.

A single dose of Madribon at the prescribed level enables a highly effective antibacterial concentration to be obtained rapidly in the plasma and maintained for a full 24 hours. 80% of the excretion takes place in the form of a highly soluble compound (glucuronide) which also possesses antibacterial activity. Madribon is extremely well tolerated; even the mild side-effects common to sulphonamides (gastro-intestinal disorders or transient skin reactions) are unusually infrequent with the customary dosage of Madribon. Because of the high degree of solubility of the form in which it is excreted (glucuronide) and the low doses of Madribon required for therapy, crystalluria and haematuria are practically excluded. Madribon can readily be given in combination with antibiotics.

Indications: Madribon is indicated in all conditions responding to sulphonamide therapy: respiratory, urinary, systemic and local infections, e.g. tonsillitis, bronchitis, pharyngitis, pneumonia, cystitis, urethritis, prostatitis, pyelonephritis, furunculosis, abscesses, paronychia, phlegmon, erysipelas, otitis media and infected wounds. The efficacy of Madribon in these diseases is based on its high bacteriostatic action against all the clinically important streptococci, pneumococci, meningococci, colibacilli, *Klebsiella pneumoniae*, *Bacillus proteus* and *pyocyaneus*, *Listeria monocytogenes* and various salmonellae, pasteurellae and shigellae.

Dosage: The average dosage in moderate cases in the adult is 1 g. of Madribon substance initially, and then 0·5 every 24 hours. Children with moderate infections are given 20 mg. per kg. bodyweight initially, and 10 mg./kg. as maintenance dose. This is equivalent to the following:

	Initial dose	*Daily maintenance dose*
Adults	2 tablets	1 tablet
Children	2 drops per kg. or ½ tablet per 10 kg.	1 drop per kg. or ¼ tablet per 10 kg.

In severe infections requiring more intensive treatment the dosage indicated should be doubled. Treatment should continue for 5-7 days or until the patient has been free of symptoms for at least 48 hours.

Precautions. The precautions customary with sulphonamide therapy should be observed.

Packings. Tablets (0·5 g.), 10, 50 and 250. Drops 10 c.c.

Madribon Roche (trade mark) is available through the usual trade channels. Further information may be obtained from Roche Products (Pty.) Ltd., 105 Quartz Street, Johannesburg.

BOOKS RECEIVED : BOEKE ONTVANG

Cell and Tissue Culture. By John Paul, M.B., Ch.B., Ph.D., M.R.C.P.Ed. Pp. viii+261. 41 figures. 30s. net + 1s. 7d. postage abroad. Edinburgh and London: E. & S. Livingstone Ltd. 1959.

Die Gefässarchitektur der Niere. Untersuchung an der Hundeniere. Heft 5. Von Prof. Dr. A. von Kügelgen, Dr. B. Kuhlo, Dr. W. Kuhlo und Dr. Kl.-J. Otto. vii+112 Seiten. 89 Abbildungen. DM 47.00. Stuttgart: Georg Thieme Verlag. 1959.

Recent Advances in Respiratory Tuberculosis. 5th edition. By Frederick Heaf, C.M.G., M.A., M.D., F.R.C.P. and N. Lloyd Rusby, M.A., D.M., F.R.C.P. Pp. cii+284. 6 plates 14 text-figures. 35s. net. London: J. & A. Churchill Ltd. 1959.

A Ciba Foundation Symposium on Medical Biology and Etruscan Origins. Edited by G. E. W. Wolstenholme, O.B.E., M.A., M.B., B.Ch. and Cecilia M. O'Connor, B.Sc. Pp. xii+255. 60 illustrations. 45s. net. London: J. & A. Churchill Ltd. 1959.

Operative Surgery. Progress Volume 1958. General Index. Under the general editorship of Charles Rob., M.C., M.Chir., F.R.C.S. and Rodney Smith, M.S., F.R.C.S. Pp. xiii+100+9+76. 162 illustrations. (This work consists of 8 volumes at £5 10s. 0d. for each volume and an index at £2 0s. 0d.) London: Butterworth & Co. (Publishers) Ltd. South African Office: Butterworth & Co. (Africa) Ltd., P.O. Box 792, Durban.

Leitfaden des Strahlenschutzes für Naturwissenschafter, Techniker und Mediziner. Von Dr. H. R. Beck, Dr. H. Dresel und Dr. H.-J. Melching. Pp. xii+253. 100 Abbildungen. 19 Tabellen. DM. 36.00. Stuttgart: Georg Thieme Verlag. 1959.

Illustrated Preoperative and Postoperative Care. By Philip Thorek, M.D., F.A.C.S., F.I.C.S. Pp. xi+98. 60 figures. 30s. net. London: Pitman Medical Publishing Co. Ltd. 1959.

Brain Memory Learning. A Neurologist's View. By W. Ritchie Russell, C.B.E., M.D. (Edin.), D.Sc. (Oxon.), F.R.C.P. (Edin. and Lond.). Pp. ix+140. 12 figures. 18s. London—New York—Toronto: Oxford University Press. 1959.

Pharmacology. 5th edition. By J. H. Gaddum, M.R.C.S., L.R.C.P., Sc.D., F.R.S. Pp. xvi+587. 93 figures. English price: 42s. London—New York—Toronto: Oxford University Press. 1959.

Treatment in Internal Medicine. By Harold Thomas Hyman, M.D. Pp. xiv+609. 42 figures. 3 color plates. 100s. net. Philadelphia and Montreal: J. B. Lippincott Company. Supplied in South Africa by Pitman Medical Publishing Co. Ltd., London. 1959.

Psychiatry in General Practice. By J. A. Weijel, M.D. Pp. viii+208. 37s. 6d. Amsterdam—London—New York—Princeton: Elsevier Publishing Company. 1958.

Handbuch der Orthopädie. Band II. Spezielle Orthopädie Rumpf (Wirbelsäule und Becken). Herausgegeben von G. Hohmann, M. Hackenbroch und K. Lindemann. xx+1,136 Seiten. 850 Abbildungen. Ganzleinen DM 174.00. Stuttgart: Georg Thieme Verlag. 1958.

X-ray Diagnosis of the Alimentary Tract in Infants and Children. By Edward B. Singleton, M.D. Pp. 352. 215 figures. $11.00. Chicago: Year Book Publishers, Inc. 1959.

Leprosy in Theory and Practice. Edited by R. G. Cochrane, M.D., Ch.B. (Glas.), F.R.C.P. (Lond.), D.T.M. and H. Pp. xv+407. 189 illustrations. 84s. + 2s. postage. Bristol: John Wright & Sons Ltd. 1959.

Reminiscences and Adventures in Circulation Research. By Carl J. Wiggers, M.D. Pp. x+404. 82 figures. $9.75. New York and London: Grune & Stratton, Inc. 1958.

Ecological Processes. By Alan Mozley, D.Sc., Ph.D., F.R.S.E. Pp. xi+68. 9s. net. London: H. K. Lewis & Co. Ltd. 1959.

Practical Obstetric Problems. 2nd edition. By Ian Donald, M.B.E., M.D., B.S. (Lond.), B.A. (Cape Town), M.R.C.S. (Eng.), L.R.C.P. (Lond.), F.R.F.P.S. (Glas.), F.R.C.O.G. Pp. xvi+712. Illustrations. 55s. net. London: Lloyd-Luke (Medical Books) Ltd. 1959.

A History of Ophthalmology. By George E. Arrington, Jr., M.D. Pp. 174. $4.00. New York: MD Publications, Inc. 1959.

BOOK REVIEWS : BOEKBESPREKINGS

INTESTINAL OBSTRUCTION

Intestinal Obstruction. By Claude E. Welch, M.D., D.Sci. (Hon.). Pp. 376. 135 figures. $10.50. Chicago: Year Book Publishers, Inc. 1958.

Claude Welch is today's proponent of a school to which investigators such as McIver and McKittrick belong. Welch's small book on intestinal obstruction covers so large a field that it reads at times like a catalogue. It is, however, adequately illustrated by many fine drawings of appropriate techniques and is well printed.

Unfortunately there is a lack of detail in the discussion of the basic pathological changes and dynamics of the various types of obstruction, especially closed and open loops and the clinical aspects of certain lesions.

The limitations of X-ray examinations are rightly stressed. A distressing recent trend is the increasing reliance of X-rays. An X-ray examination is often requested for a very ill patient who is only too evidently in need of resuscitation and operation. At the best the clinical diagnosis of obstruction or perforated viscus is only confirmed on X-ray examination without indicating the site of the obstruction.

From an analysis of a large series of cases the author draws the important conclusion that tenderness is as common with the simple as with the strangulating obstruction. He indicates the increasing incidence of cancer and diverticulitis as causes of obstruction. In the section on atresia there appears to be lack of support for what seems most necessary for a successful outcome in most cases, that is, resection of the grossly dilated proximal pouch with its doubtful circulation.

The author points out the risks, in cancer of the colon, of secondary small-bowel obstruction after by-pass operations. He states that recent advances in anaesthesia and the management of fluid balance, have diminished the risks of operation, especially on the right colon, since small intestine can be anastomosed to colon. This is the case even in the acute phase in performing the more difficult operation of resection as a one-stage procedure in an obstructed case.

The advice to kill the worms and resect the portion of bowel concerned for obstruction caused by ascarides seems drastic. Live worms often cause intense colic but they hardly ever cause true obstruction so that resection is rarely necessary.

The impression is given that volvulus of the sigmoid results from an adult form of megacolon. In those races, however, who have a high incidence of abnormally long pelvic colons and volvulus, 'megacolon' occurs only with repeated torsion as part of the compensating hypertrophy.

The best chapters are those on ileus, peritonitis and post-operative obstructions and for these conditions the author advocates an energetic approach. He stresses the need for more care of the peritoneum during operation and the avoidance of bare areas to reduce the frequency of post-operative obstructions. Believing that morphia perpetuates ileus, and in view of the fact that distended bowel will not contract, he advises operative relief within 5 days if an ileus fails to recover to deflate small bowel by aspiration, eliminate mechanical blocks by attention to adhesions and kinks, and drain abscesses or by-pass them by suitable anastomoses. Because the mortality of post-operative obstructions is today still high, he warns against too long a reliance on catheter suction when early operation is required.

Despite the drawbacks of the compendium-like presentation of this book, general surgeons should enjoy reading what is an ample review and revision, knowing that it is by one of the masters of this all too common and dangerous condition.

D.S.C.

CORRESPONDENCE : BRIEWERUBRIEK

BACK ACHE WITHOUT NEUROLOGICAL SIGNS

To the Editor: In my letter[1] as published in the *Journal* of 21 March, urging the importance of simple manipulative procedures in the relief of pain, my point in regard to unorthodox practitioners is not well brought out. The fact is that unorthodox practitioners *do* apply manipulative procedures for back ache, and in many of their cases the pain *is* relieved. My point is that this treatment should be available *within* the orthodox profession.

P. H. Dalgleish

P.O. Box 79
Hill Crest, Natal
2 April 1959

1. Correspondence (1959): S. Afr. Med. J., 33, 264.

STORAGE OF BIOLOGICAL PRODUCTS

To the Editor: I should like to make use of your *Journal* to bring to the notice of medical practitioners the necessity for careful storage of biological products under conditions where they will not deteriorate.

This matter is of particular importance in connection with poliomyelitis vaccine, which loses its potency rapidly if stored at ordinary room temperature and, of course, much more rapidly if exposed to high temperatures such as those which build up in a motor car left standing in the sun. It is most important that this vaccine should be stored in a refrigerator if it is kept for more than a few days. An ordinary domestic refrigerator which maintains a temperature of below 10°C (i.e. 50°F) will serve the purpose very well if no special storage facilities are available. Stored at this temperature the vaccine will remain potent for at least 6 months.

Other biological products should also be stored under these conditions to avoid loss of potency. Particular mention must be made of smallpox vaccine, which often has to be transported by car and used in country districts. Special care should be exercised to ensure that it is protected from high temperatures as far as possible and that the period of time between taking it out of the refrigerator and using it is as short as possible.

It is hardly necessary to emphasize the great importance of this matter. The disastrous effects which would arise out of the false sense of security engendered by the use of vaccines which have lost their potency will be only too evident to all medical practitioners.

J. J. du Pré le Roux
Secretary for Health

Department of Health
P.O. Box 386, Pretoria
2 April 1959

THE PSYCHIATRIC DAY HOSPITAL

To the Editor: I have just received a copy of your *Journal* of 6 September 1958, which includes an article *The spychiatric day hospital: an evaluation of 4 years' experience* by Dr. L. S. Gillis,[1] and I would like to clear up one point where some misapprehension seems to arise.

Dr. Gillis writes that as a result of Cameron's work in Montreal work centres have been established elsewhere, notably in London. When I made preparations for the Day Hospital in London and bought the houses necessary for it in 1944-5, when I saw the first patient in 1946, and when the work was fully established in 1947-48, I had not at any time the slightest idea that Cameron had started something similar in Montreal. As it has turned out in practice the Day Hospital as conceived by Dr. Cameron is something completely different from the Day Hospital which we run in London.

Joshua Bierer

9 Fellows Road
Hampstead, London, N.W.3.
31 March 1959

1. Gillis, L. S. (1958): S. Afr. Med. J., 32, 881.

[*Dr. Gillis writes:* At the time of writing my article on the Psychiatric Day Hospital, I was unaware of the fact that Dr. Bierer had established his Day Hospital as early as 1944-45, and I welcome his information about its inception. Also the correction of my statement which was, of course, made in good faith.]

IRON-DEFICIENCY ANAEMIA IN CHILDHOOD

To the Editor: We should like to congratulate you on the excellent Editorial[1] which appeared under this title in your edition of 31 January 1959.

We agree almost entirely with your comments. Not only that, but it is refreshing to have them expressed so clearly. The great significance of iron deficiency states in the general health and well-being of patients is not as widely appreciated as it should be. Undoubtedly they are analogous to vitamin deficiencies in their effects. You mention predisposition to infection; we would add that iron is vitally important to growth and health, and that chronic deficiency of iron in adults may cause a variety of degenerative and atrophic changes of the gut and cardiac impairment, and aggravate neuroses.[2-4]

The full replenishment of the iron deficit of child and adult alike is thus vitally important. This entails more than merely replenishing the iron deficit in terms of haemoglobin. There must be adequate iron in the tissues, e.g. in tissue enzymes,[5,7,10] and in the muscle myoglobin. Additionally, to ensure that these are as replete as possible, and that they will remain so, the body must have an adequate amount of iron held in reserve, normally in the reticulo-endothelial systems of the liver, spleen and bone marrow.

This may be a somewhat larger problem than you have appreciated. Whilst up to 10 mg. of iron a day may be absorbed by anaemic patients on a strict regimen of oral iron tablets or syrups, this is usually a maximum figure. Moreover, of course, as the haemoglobin level rises in response to the therapy, the absorption will fall towards its more usual levels of 1-2 mg. per day, in spite of the amount of iron ingested. In these circumstances it is difficult for oral iron adequately to meet the iron needs of the tissues, myoglobin and stores, except over a protracted term which extends into a year and more.[6,7,9] By contrast, iron can be given intramuscularly in specific amounts calculated to meet the full requirements of each particular patient. Not only that, but it can be given safely, even to premature babies,[8] effectively and very easily. The tonic effect mentioned by you is often very marked within a few days after the first injection, owing, we believe, to the almost immediate replenishment of the vital tissue enzymes.

We are only sorry that, in what was a most excellent editorial, you did not mention the value of intramuscular iron therapy.

Holmes Chapel
Cheshire, England
16 March 1959

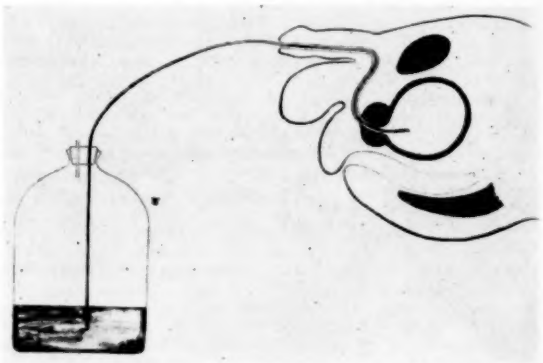
J. Kingsley Law
for *Benger Laboratories Ltd.*

1. Editorial (1959): S. Afr. Med. J., 33, 89.
2. Exton-Smith (1957): Practitioner, 179, 448.
3. Zoll and Norman (1952): Circulation, 6, 832 and 840.
4. Israels (1958): Brit. J. Clin. Pract., 12, 455.
5. Beutler (1957): Amer. J. Med. Sci., 234, 517.
6. Haskins *et al.* (1952): J. Clin. Invest., 31, 543.
7. Hayhoe (1956): *British Encyclopedia of Medical Practice: Medical Progress*, p. 47. London: Butterworth.
8. Gaisford and Jennison (1955): Brit. Med. J., 2, 700.
9. Gillman and Harthorn (1958): *Ibid.*, 2, 635.
10. Stevens (1956): Arch. Intern Med., 98, 550.

A NEW TYPE OF CATHETER FOR URETHRAL DRAINAGE OF THE BLADDER

To the Editor: At the 13th Annual Meeting of the British Association of Urological Surgeons in London on 27 June 1957 Mr. Norman Gibbon[1] described a new type of catheter for urethral drainage of the bladder, which had been developed and employed at the Liverpool Regional Paraplegic Centre. The catheter is produced by Portland Plastics Ltd., Bassett House, Hythe, Kent, and consists of polyvinyl-chloride tubing ('Portex' tubing), which is pliable and heat resistant and can therefore be sterilized by boiling, and which has the added advantage of being virtually non-irritant to the urethra. The catheter is of sufficient length to extend from within the bladder to the collecting bottle so that a closed system of drainage may be set up with no connecting pieces where infection may be introduced. It is secured in the bladder by means of two plastic 'wings' welded to the catheter, which are attached to the shaft of the penis with a single strip of adhesive strapping.

Impressed by the claims made for this catheter, we have used it after prostatic surgery and we are very well pleased with the



Closed bladder drainage with Gibbon catheter. The fluid in the bottle is hibitane solution.

results that we have obtained so far. We have employed the catheter after 7 cases of retropubic prostatectomy and in none of these have bladder washouts been necessary. The catheter has been removed on the 2nd or 3rd post-operative day and the average length of stay in hospital following surgery has been 11 days. We have used this catheter after transurethral resection of bladder tumours and median bars, with equally satisfactory results. The great fallacy of almost all other types of catheter is that if any clots are present they tend to block the lumen of the catheter, which then requires washouts and irrigations to re-establish free drainage. The more frequently this occurs, the greater the likelihood that infection will be introduced and the patient's convalescence delayed. In our practice we have used an 18F Gibbon catheter and in no instances have bladder washouts been carried out; in fact, the length of the tube and the difficulty in performing a washout through it discourages the nursing staff, particularly at night, from attempting this procedure. Even with so small a gauge as 18F the effective lumen of this type of tubing is so large in comparison with other types that clots are able to pass down quite readily. Furthermore, the tube being transparent, the surgeon is reassured by being able to see the clots passing down it. We feel that this adjunct to the urological armentarium deserves the attention of our colleagues.

224 Lister Building
Johannesburg
31 March 1959

G. Clifford Thomson
Cyril Wiggishoff

1. Gibbon, N. (1958): Brit. J. Urol., 30, 1.